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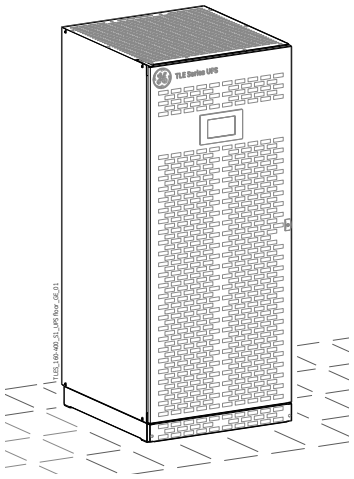

User Manual

Uninterruptible Power Supply

TLE Series 160 & 200

160 & 200 kVA / 400Vac CE / S1

GE Consumer & Industrial SA
General Electric Company
CH – 6595 Riazzino (Locarno)
Switzerland
T +41 (0)91 / 850 51 51
F +41 (0)91 / 850 52 52
www.gecriticalpower.com

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Certified
Quality System
ISO 9001

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The illustrations and plans describing the equipment are intended as general reference only and are not necessarily complete in every detail.

The content of this publication may be subject to modification without prior notice.

Dear Customer,

We thank you for selecting our products and are pleased to count you amongst our very valued customers at ***GE's Critical Power***.

We trust that the use of the ***TLE Series 160 & 200*** Uninterruptible Power Supply System, developed and produced to the highest standards of quality, will give you complete satisfaction.

Please carefully read the *User Manual*.
It contains all the necessary information about the installation of the UPS.

Thank you for choosing ***GE's Critical Power*** !

GE Consumer & Industrial SA
General Electric Company
CH – 6595 Riazzino (Locarno)
Switzerland

Distributed by:

Your service contact:

Preface

Congratulations on your choice of a *TLE Series 160* & *200* Uninterruptible Power Supply (UPS).
It will keep you away from any trouble due to unexpected power problems.

This manual describes how to prepare the installation site, provides weight and dimensions and procedures for moving, installing and connecting the UPS, and details of maintenance procedures suggested to preserve maximum reliability.

It explains the function of the UPS module, the purpose and location of the switches, the meaning of the system events related to the front panel indication, and provides procedures for starting and stopping the equipment.

While every care has been taken to ensure the completeness and accuracy of this manual, *GE's Critical Power* assumes no responsibility or liability for any losses or damages resulting from the use of the information contained in this document.

WARNING!
TLE Series 160 & *200* is a product for restricted sales distribution to informed partners.
Installation restrictions or additional measures may be needed to prevent disturbances.

We recommend that this manual is kept next to the UPS for future references.
If any problems are encountered with the procedures contained in this manual, please contact your *Service Centre* before you proceed.

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Due to technical improvements, some of the information contained in this manual may be changed without notice.

Safety instructions

Carefully read the safety instructions contained on the following page before the installation, start-up and maintenance of the UPS, options and battery.
Pay attention to the rectangular boxes included in the text:
They contain important information or warning concerning electrical connections and personnel safety.

RPA
Redundant Parallel Architecture

Parallel System secured with RPA

When included in the text, this symbol refers to operation needed only For the RPA Parallel System.

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1 SAFETY RULES

Save these instructions!

GENERAL

- Move the UPS in an upright position in its original package to the final destination room.
  To lift the cabinets, use a forklift or lifting belts with spreader bars.
- Check for sufficient floor and elevator loading capacity.
- Check the integrity of the UPS equipment carefully.
  If you notice visible damage, do not install or start the UPS.
  Contact the nearest Service Centre immediately.
- WARNING! RISK OF ELECTRICAL SHOCK:
  Do not remove covers, there are no user serviceable parts inside.
- After switching off takes 5 minutes for the DC capacitors to discharge because a lethally high voltage remains at the terminals of the electrolytic capacitors.
- All maintenance and service work should be performed by qualified service personnel.
  The UPS contains its own energy source (battery).
- The field-wiring outlets may be electrically live, even when the UPS is disconnected from the mains.
- Dangerous voltages may be present during battery operation.
- The battery must be disconnected during maintenance or service work.
- This UPS contains potentially hazardous voltages.
- Be aware that the inverter can restart automatically after the mains voltage is restored.
- End user must follow applicable regional occupational safety codes/regulations during installation, operation and equipment maintenance. This may require additional field marking or labelling defining appropriate level of PPE (Personal Protection Equipment) to reduce the risk of Arc-flash related injuries.
  Contact our Technical Support for product specific information.

INSTALLATION

- This UPS must be installed and connected only by trained personnel.
- Verify accurately during Commissioning and Maintenance of the UPS, for the following:
  Damaged components, squeezed wires and cables, or not correctly inserted plugs.
- After removing the sidewalls of the UPS, make sure that all earth connections when reassembling, are correctly reattached.
- This UPS is intended for use in a controlled indoor environment free of conductive contaminants and protected against animals intrusion.
- WARNING! HIGH EARTH LEAKAGE CURRENT:
  Earth connection is essential before connecting to AC input!
- Switching OFF the unit does not isolate the UPS from the mains.
- Do not install the UPS in an excessively humid environment or near water.
- Avoid spilling liquids on or dropping any foreign object into the UPS.
- The unit must be placed in a sufficiently ventilated area; the ambient temperature should not exceed 35°C (95°F).
- Optimal battery life is obtained if the ambient temperature does not exceed 25°C (77°F).
- It is important that air can move freely around and through the unit. Do not block the air vents.
- Avoid locations in direct sunlight or near heat sources.

STORAGE

- Store the UPS in a dry location; storage temperature must be within -25°C (-13°F) to +55°C (131°F).
- The optimal temperature for Battery storage is 20°C (68°F) to 25°C (77°F) and shall never exceed the range -20°C (-4°F) to 40°C (104°F).
- If the unit is stored for a period exceeding 3 months, the battery must be recharged periodically (time depending on storage temperature).

BATTERY

- The battery-voltage is dangerous for person's safety.
- When replacing the battery, use the same number, voltage (V) and capacity (Ah).
- Proper disposal or recycling of the battery is required.
  Refer to your local codes for disposal requirements.
- Never dispose of battery in a fire: they may explode.
- Do not open or mutilate battery: their contents (electrolyte) may be extremely toxic.
  If exposed to electrolyte, wash immediately with plenty of water.
- Avoid charging in a sealed container.
- Never short-circuit the batteries.
  When working with batteries, remove watches, rings or other metal objects, and only use insulated tools.

Safety instructions when working with battery

EXTERNAL BATTERY MUST BE INSTALLED AND CONNECTED TO THE UPS BY QUALIFIED SERVICE PERSONNEL.
INSTALLATION PERSONNEL MUST READ THIS ENTIRE SECTION BEFORE HANDLING THE UPS AND BATTERY.

DANGER!

Full voltage and current are always present at the battery terminals.
The battery used in this system can provide dangerous voltages, extremely high currents and a risk of electric shock.
If the terminals are shorted together or to ground they may cause severe injury.
You must be extremely careful to avoid electric shock and burns caused by contacting battery terminals or shorting terminals during battery installation.
Do not touch uninsulated battery terminals.

A qualified service person, who is familiar with battery systems and required precautions, must install and service the battery.
The installation must conform to national and local codes.
Keep unauthorised personnel away from the battery.

The qualified service person must take these precautions:

1 Wear protective clothing, such as rubber gloves and boots and protective eye wear
Batteries contain caustic acids and toxic materials and can rupture or leak if mistreated.
Remove rings and metal wristwatches or other metal objects and jewellery.
Do not carry metal objects in your pockets where the objects can fall into the battery cabinet.

2 Tools must have insulated handles and must be insulated so that they will not short battery terminals.
Do not allow a tool to short between individual or separate battery terminals or to the cabinet or rack.
Do not lay tools or metal parts on top of the battery, and do not lay them where they could fall onto the battery or into the cabinet.

3 Install the battery as shown on the drawing provided with the battery.
When connecting cables, never allow a cable to short across a battery's terminals, the string of battery, or to the cabinet or rack.

4 Align the cables on the battery terminals so that the cable lug will not contact any part of the cabinet or rack, even if the battery is moved.
Keep the cable away from any sharp metal edges.

5 Install the battery cables in such a way that the UPS or battery cabinet doors cannot pinch them.

6 Do not connect the battery terminal to Ground.
If any battery terminal is inadvertently grounded, remove the source of the ground.
Contacting any part of a grounded battery can cause a risk of electric shock.

7 To reduce the risk of fire or electric shock, install the battery in a temperature and humidity controlled indoor area, free of contaminants.

8 Battery system chassis ground (earth) must be connected to the UPS chassis ground (earth).
If you use conduits, this ground conductor must be routed in the same conduit as the battery conductors.

9 Where conductors may be exposed to physical damage, protect the conductors in accordance with all applicable codes.

10 If you are replacing the battery or repairing battery connections, shut OFF the UPS and remove the battery fuses.

1.1 SAFETY SYMBOLS AND WARNINGS

Safety warnings

The text of this manual contains some warnings to avoid risk to the persons and to avoid damages to the UPS system and the supplied *critical Loads*.
The non-observance of the warnings reminding hazardous situations could result in human injury and equipment damages.

Please pay attention to the meaning of the following warnings and symbols:

	WARNING ! **Referred to procedures or operations which could cause damages to the persons or to the system, when not correctly operated.**
	NOTE ! **Warns the user about important operations or procedures described in this manual.**

Safety symbols

When the text includes one or more of the following symbols, that means exist a potentially hazardous situations.

Please remind the meaning of each symbol.

	CAUTION **Related to all the potentially hazardous situations which may result in injury.**
	DANGER OF PARTS ELECTRICALLY LIVE **Related to all the situation with potentially hazardous voltage.**
	DANGER OF EXPLOSION **Used to indicate conditions where exploding parts can cause serious injury.**
	DANGER OF CRUSHING **Used when moving the equipment due to the heavy weight.**
	DANGER OF OVERHUNG LOAD **Used when the equipment is lifted by a crane.**
	DANGER OF HOT SURFACE **Used to indicate conditions of elevated temperature on some parts.**
	DO NOT TOUCH **Risk of parts with hazardous voltages or parts in movement.**

2 LAYOUT

2.1 LAYOUT TLE Series 160 & 200

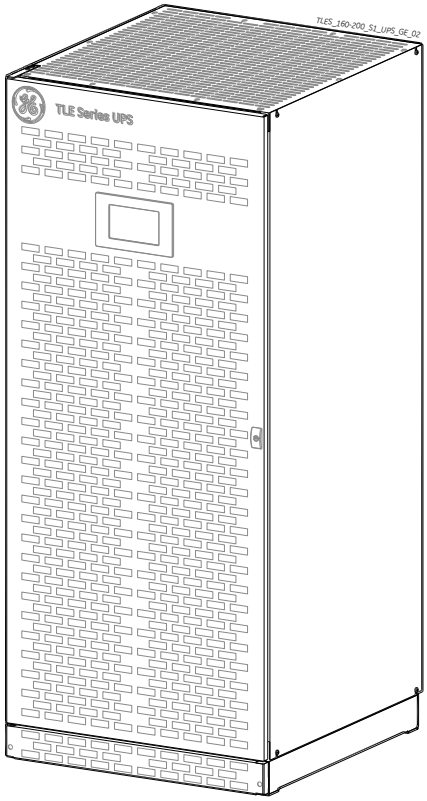


Fig. 2.1-1 General view

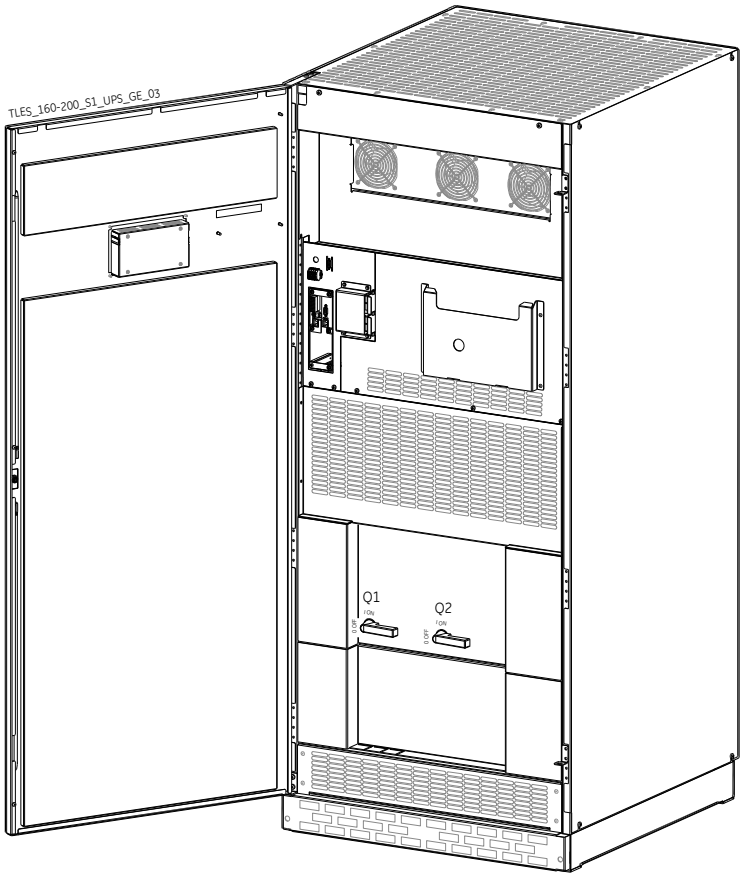


Fig. 2.1-2 General view with open doors

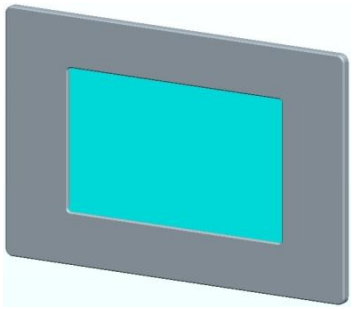


Fig. 2.1-3 Control panel

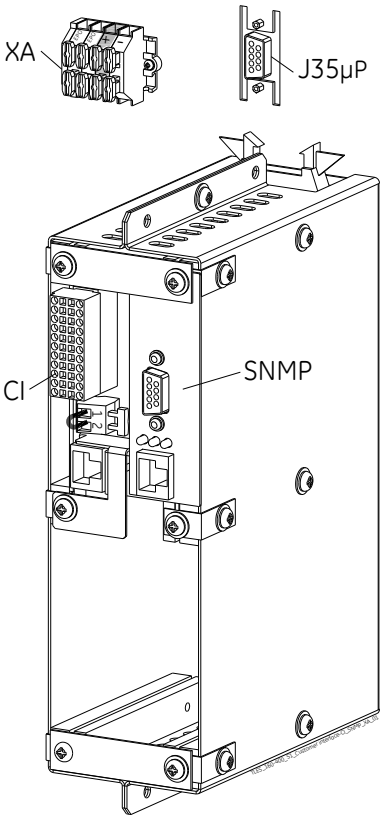


Fig. 2.1-4 Connectivity Rack

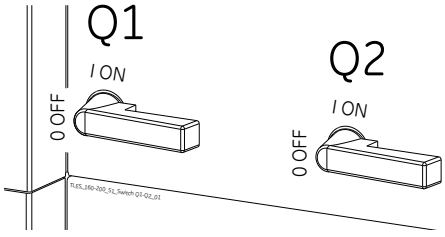


Fig. 2.1-5 Manual switches Q1 and Q2

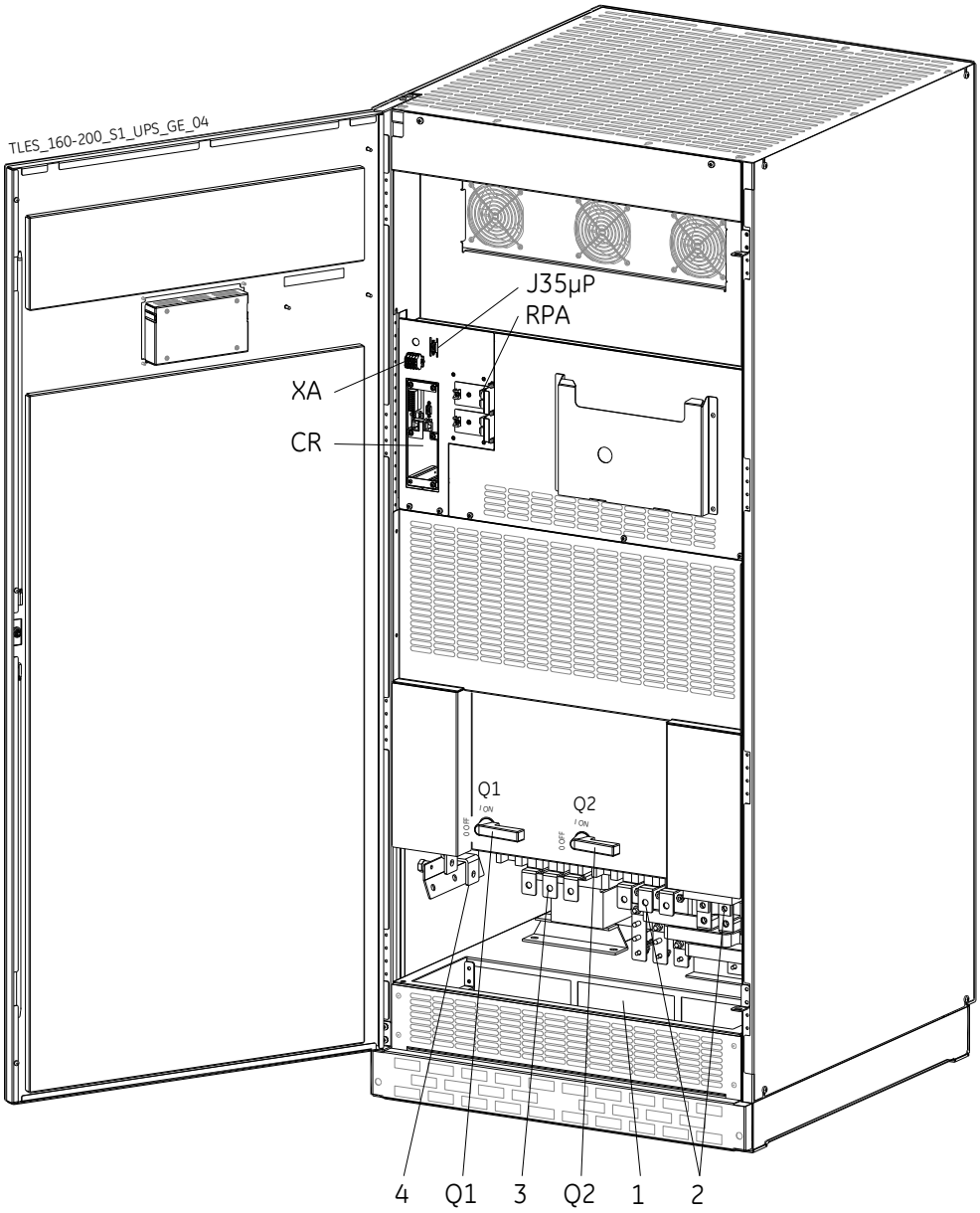


Fig. 2.1-6 General view without protection panels

1 Opening for input and output of power connection cables

2 Bus bars for Mains Input connection

3 Bus bars for Load Output connection

4 Bus bars for external Battery connection

CI Customer Interface Board

CR Connectivity Rack

J35µP Serial port RS232 for IMV protocol

Q1 UPS output switch

Q2 Manual Bypass switch

RPA RPA board (Redundant Parallel Architecture) for Parallel System (option)

SNMP 3-ph SNMP/WEB plug-in adapter (option)

XA Terminals for EPO (Emergency Power Off) and 24Vdc Auxiliary Power Supply connection (option)

3 INTRODUCTION

The ***TLE Series 160 & 200 Uninterruptible Power Supply*** (UPS) provides the energy supply for critical loads which need a reliable, continuous free from voltage disturbances and frequency fluctuations supply

In case the power provided by the *Mains Fails*, or exceeds the permitted tolerances, the power to supply the *Load* is provided by the *Battery* for the specified time at the rated *Load* (or longer at a reduced *Load*) or until the *Mains* power returns.

VFI Voltage & Frequency Independent

TLE Series 160 & 200 is a truly *VFI* double conversion ***Uninterruptible Power Supply*** (UPS), equipped with *automatic bypass*, where the ***load*** is normally supplied by the ***inverter***.

TLE Series 160 & 200 can be configured, if chosen, for the ***eBoost™ Operation Mode*** (Option - High efficiency: up to 99% / Fast power transfer: <2ms) permitting maximum energy saving.

eBoost™

If the *Inverter* is not able to supply the required *Output Voltage*, or when overload or short-circuit on the output occur, the *Load* is instantly transferred to the *Mains* via the *Automatic Bypass*.
The UPS automatically returns to normal mode when the failure condition is restored.

KEY FEATURES:

More Critical equipment supported

Rated at 1 Power Factor, *TLE Series 160 & 200* delivers more real power than other UPS in the market.
With today's trend toward power factor corrected loads, *TLE Series 160 & 200* can support more total *Load* than any other UPS available, allowing you to support a greater number of today's enterprise computing *Power Factor Corrected (PFC)* equipment.

High Efficiency

Thanks to type *Advanced Neutral Point Clamped* three level *IGBT* technology, *TLE Series 160 & 200* guarantees a high overall performance.
Intelligent Energy Management (IEM) combined with *RPA*, results in the most cost efficient and reliable UPS solution in the industry.

Fully digital

Digital Signal Processor (DSP), Flash memory and *Advanced Neutral Point Clamped* are the technology corner stones of a new age of power quality and power reliability.

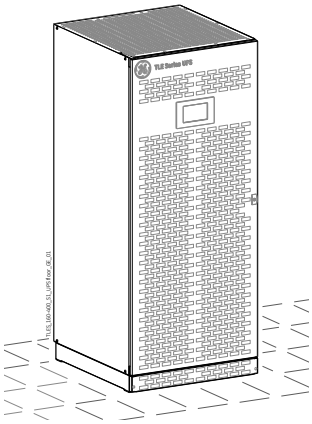
RPA™ - Redundant Parallel Architecture™ Parallel System

GE's Critical Power provides a unique technology called *Redundant Parallel Architecture™ (RPA™)* that can parallel Uninterruptible Power Supply (UPS) modules with true redundancy.
With *RPA™*, there is no need for external electronics or switches to control the UPS modules in the parallel system.
One of the UPS modules in the system arbitrarily takes a leadership role, while the other UPS modules have access to all control parameters.
If one UPS fails to operate, the load is automatically redistributed among the others.
If the lead UPS fails to operate then a different UPS automatically takes on the leadership role.
The *RPA™* systems are designed to have no single points of failure, ensuring the highest level of power protection for critical loads.

Extremely flexible

Tailor made power protection to meet your individual installation requirements; *TLE Series 160 & 200* offers various options like *EMC filter* and our comprehensive *software* for mission control and data protection to cover all your application needs.

4 DESCRIPTION



TLE Series 160 & 200 is one of the best performing and most reliable three-phase UPS systems providing critical power protection for a wide range of applications.

Every *TLE Series 160 & 200* system operates in *VFI mode (Voltage Frequency Independent)* yielding the maximum levels of power reliability for all mission-critical processes.

With proven technology the *TLE Series 160 & 200* UPS provides top class reliability and performance.

With backfeed protection and compliance to *EMC standards* the *TLE Series 160 & 200* complies to current and future standards.

Reliability can be further increased by paralleling up to eight UPS units utilising GE's unique *RPA™ technology (Redundant Parallel Architecture)*.

With *RPA* every UPS is controlled in a true peer-to-peer configuration with redundancy in all critical elements and functions, eliminating all single points of failure.

The decentralised bypass offers great flexibility to up or down grade the system in case future needs might change.

***TLE Series 160 & 200*, BEST IN CLASS EFFICIENCY**

- High efficiency in double conversion mode up to 96.5% and *eBoost™* operation mode up to 99%.
- High efficiency at partial and reduced loads for cost benefits in operating conditions.
- *TLE Series 160 & 200* products designed in compliance with IEC 62040-2 standard, C3 level for immunity, i.e. can withstand possible disturbances and noise without affecting standard operating conditions
- Advanced User Interface with touch screen display guided menu.
- Reduced energy consumption costs.
- Reduced size and costs of the air conditioning system.
- Compact design, saving installation space.

	NOTE ! **Through their complete life cycle, all *GE's Critical Power UPS systems* are fully supported by service teams which provide world-class, 24x7 preventive and corrective services, training and application expertise.**

4.1 BLOCK DIAGRAM AND MAIN ELEMENTS

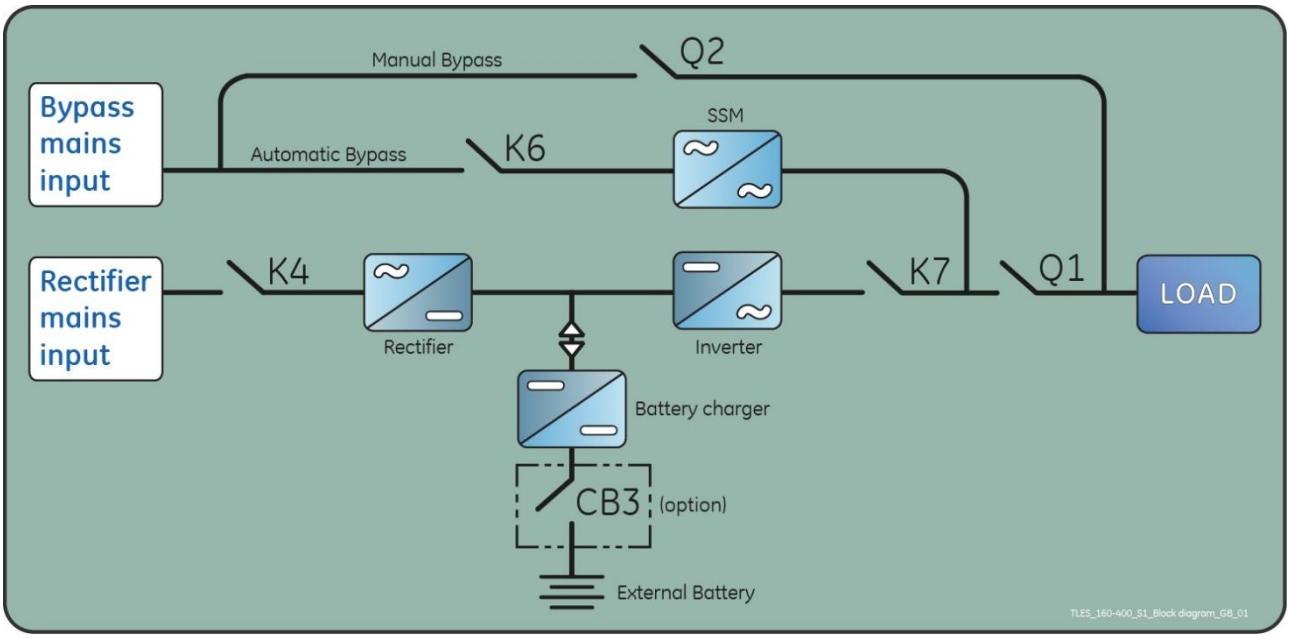


Fig. 4.1-1 Block Diagram

The *TLE Series 160 & 200* system can be divided into the following main elements:

Control System
TLE Series 160 & 200 is designed with microprocessor-controlled signal processing circuits.
The interface between the operator and the unit is provided by the monitoring system on the front panel.
This monitoring system consists of an active mimic diagram, a keyboard and a backlit display.

Rectifier
The *Active IGBT Rectifier* converts the 3-phase mains voltage into a controlled and regulated DC-voltage, supplying the *inverter* and to charge the *battery* through the *battery-charger*.
Thanks to modulation strategy applied to *IGBT bridge*, the *rectifier* provides clean input power in terms of low *THDi* and unity power factor.

Inverter
The *Inverter* converts the DC voltage into a three-phase AC-voltage with constant amplitude and frequency, which is completely independent and isolated from the AC-input voltage.

Automatic Bypass
The Automatic Bypass consists of a static semiconductor-switch *(SSM: Static Switch Module)*, used to provide an uninterrupted transfer of the *Load* from *Inverter to Mains*.

Back-feed Protection
All *TLE Series 160 & 200* UPS's are equipped with an automatic system for the protection against voltage back feeding towards *Mains*, through the *Bypass* (Applied Standard *IEC 62040-1*).
This protection works automatically by opening *contactor K6* (in series with the thyristors of the static switch) and eventually *K7*, and acts in case of internal defects of the system, or due to wrong manipulations on the *Manual Bypass Q2*.

Manual Bypass
The *Manual Bypass* consists of a pair of manual switches *(Q1* and *Q2)*, which removes the UPS from the *Load* for maintenance, while still supplying the *Load* with power directly from the *Mains*.

Battery
The *Battery* supplies the DC power to the *Inverter* when the *Mains* is out of acceptable tolerances.

4.2 OPERATION MODES

4.2.1 Normal VFI Operation Mode (Voltage Frequency Independent)

Under normal conditions the *Load* is permanently powered by the *inverter* with constant amplitude and frequency.

The *Rectifier*, powered by the *Mains*, supplies the *inverter* and the *battery-charger* keeps the *battery* fully charged.

The *inverter* converts the DC voltage in a new AC sine wave voltage with constant amplitude and frequency independently from the input *Mains Power*.

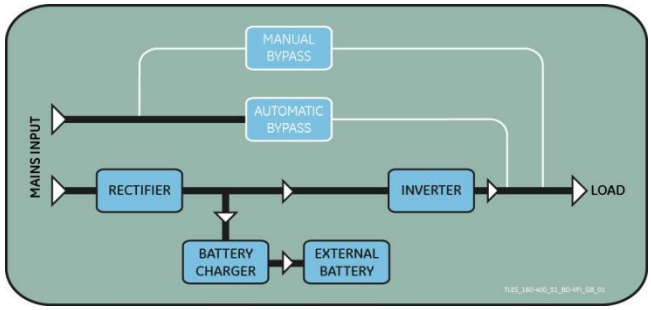


Fig. 4.2.1-1 Block diagram normal operation mode

4.2.2 eBoost™ Operation Mode (option)

eBoost™
e High efficiency (up to 99%)
Boost Fast power transfer (< 2ms)

When the *eBoost™ Operation Mode* is selected, and the *Mains Power* is available, the *Load* is normally powered through the *Automatic Bypass*.

When the *Mains Voltage* is detected out of the prescribed tolerances, the *Load* is automatically transferred to the *Inverter*.

When the *Mains* recovers, the *Load* returns to the *Automatic Bypass* after a variable time defined by the control unit.

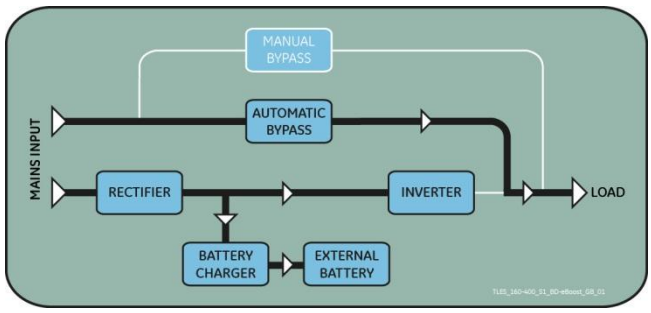


Fig. 4.2.2-1 Energy flow in eBoost™ Operation Mode

The *eBoost™ Operation Mode* can be used for *single units* or the *RPA Parallel System*, for up to 6 UPS modules, with all units individually able to supply power through a redundant communication bus.

The *eBoost™ Operation Mode* can be configured directly by the user for higher efficiency, considering the *Mains* reliability and criticality of the *Load*.

The selection between the two operation modes "*VFI* mode and *eBoost™ Operation Mode*", or switching between operation modes at required time, can be done through the UPS *control panel* (see *Section 7.4 / eBoost*).

NOTE !

The *eBoost™ Operation Mode* is available only if enabled at the factory or by a *GE GLOBAL SERVICES FIELD ENGINEER*.

4.2.3 Mains Failure Operation

When the *Mains* is no longer within acceptable tolerances, the *Battery* will provide the DC power to the *Inverter*.
The *Inverter* will maintain continuous AC power to the *Load* until the *Battery Voltage* reaches the lower limit of the *Inverter* operation capability.
During the discharge, the *LCD screen* shows the estimated time the *Battery* can support the *critical Load*.
Prior to complete *Battery* discharge, the "***stop operation***" alarm (shut-down imminent) warns the operator that the *Battery* is almost discharged and the UPS is about to shut down.

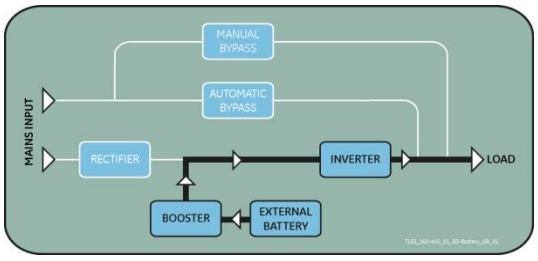


Fig. 4.2.3-1 Block diagram Mains Failure operation

RPA
Redundant Parallel Architecture

In case of RPA Parallel System

With a Parallel System for power capacity (see Section 3.3)

- *With the **Bypass Mains power available,** a "Battery low" warning on any unit will cause the Load to be transferred to Mains (after a selectable time delay).*
- *With **Bypass Mains power** not available, a "Battery low" warning on any unit will start the "**stop operation**" timer (adjustable).*
  *The Load will shut down at the end of the "**stop operation**" time period.*

With a Parallel System for redundancy (see Section 3.3)

- *When a Battery low warning occurs on a unit not necessary to support the present Load, this unit will shut down after a timeout period (selectable).*
  The Load is shared between the other units.
- *As the warning occurs on one unit necessary to support the present Load, the system starts the "**stop operation**" timeout (selectable).*
  *The Load will shut down at the end of the "**stop operation**" time period.*

4.2.4 Mains Recovery Operation

As soon as the AC input power recovers, the ***Rectifier* will start automatically**, supplying DC power to the *Inverter* and recharging the *Battery*.
If the *Inverter* was previously shut down due to low *Battery*, the *Load* will be initially powered by *Mains* through the *Automatic Bypass*.
When the *Battery* is sufficiently recharged to ensure a minimum time of operation with the present *Load*, the *Inverter* will start automatically and the *Load* will be transferred back to the *Inverter*.

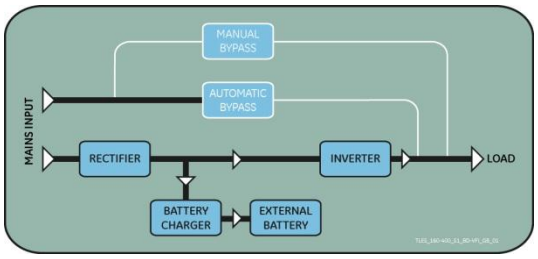


Fig. 4.2.4-1 Block diagram Mains recovery operation

RPA
Redundant Parallel Architecture

In case of RPA Parallel System

*When the AC input power recovers, **the Rectifiers will start-up sequentially,** according to their number in the Parallel System. This minimizes the **initial inrush current.***
*The **Inverters will start-up automatically**, but only when the Battery has been sufficiently recharged for a **minimum runtime** with the present Load.*
When** enough Inverters to supply the Load have been restarted, **the Load will be transferred from the Automatic Bypass back to the Inverter output.

4.2.5 Automatic Bypass

In normal operation, the *Load* is supplied by the *Inverter*.

When the control system detects a fault in the *Inverter*, an overload condition or a short-circuit condition, the *Automatic Bypass* will transfer the critical *Load* to the *Mains* without interruption.

When the *Inverter* recovers, or the overload or short-circuit condition is corrected, the *Load* will be automatically transferred back to the *Inverter*.

If the UPS is unable to return to normal mode following an automatic transfer to *Bypass mode*, an alarm condition will be initiated.

A *Manual Bypass* (operator initiated) will not be considered as an alarm condition.

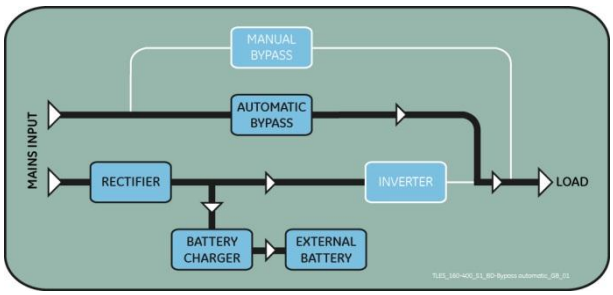


Fig. 4.2.5-1 Block diagram Automatic Bypass

RPA
Redundant Parallel Architecture

In case of RPA Parallel System

Each unit has its own internal Bypass.

These units are continuously exchanging information, enabling all of the internal Bypass circuits in a Parallel System to operate simultaneously.

If the Inverter of a unit fails, its Bypass circuit remains available to the Parallel System.

*It is excluded only if the unit is separated from the common bus by opening its output switch **Q1**.*

4.2.6 Manual Bypass

The *Manual Bypass* circuit consists of manual switches ***Q1*** and ***Q2***, which permits transfer of the *Load* directly to the unconditioned AC power without interruption, leaving the UPS available for maintenance.

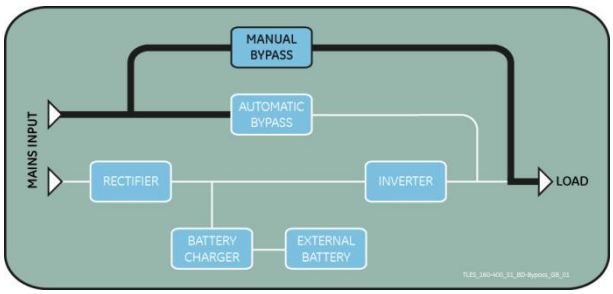


Fig. 4.2.6-1 Block diagram Manual Bypass

RPA
Redundant Parallel Architecture

4.3 RPA PARALLEL SYSTEM OPERATION

4.3.1 Introduction to the RPA Parallel System

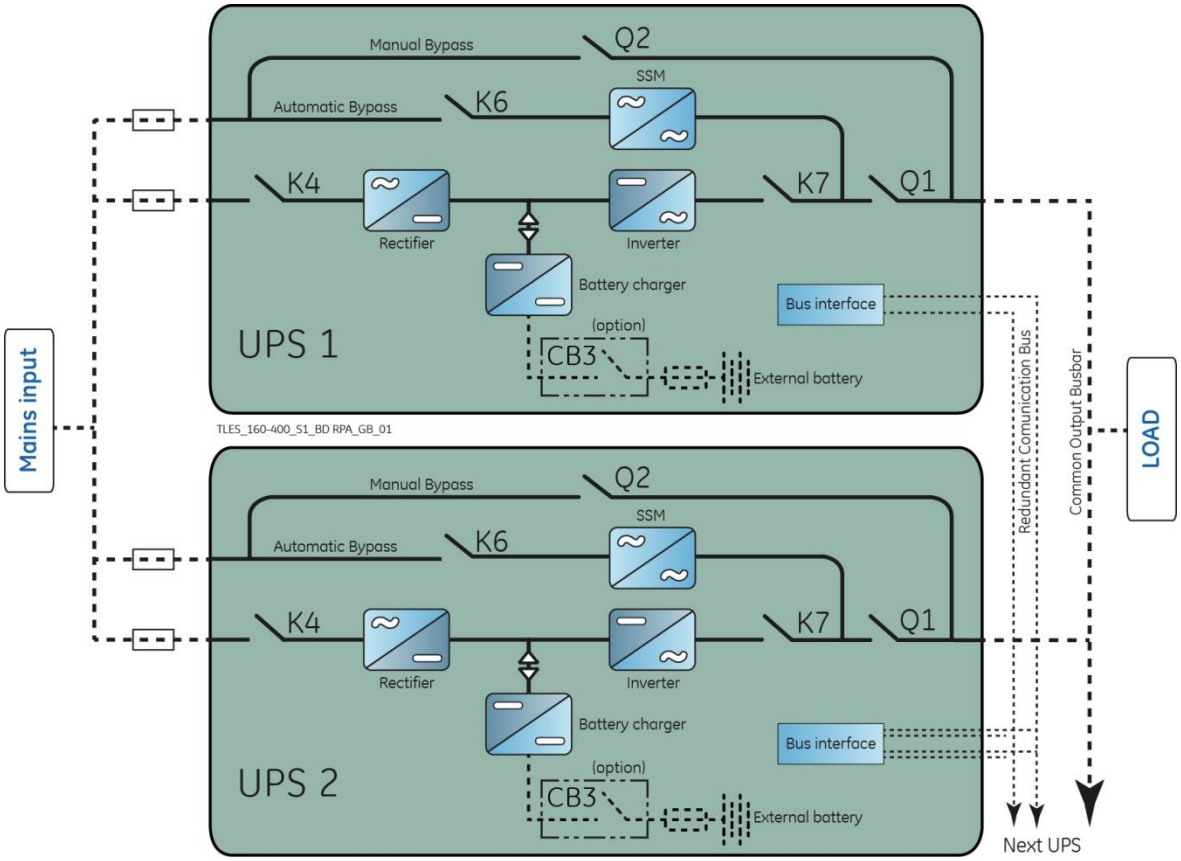


Fig. 4.3.1-1 Block diagram RPA Parallel System operation

Two or more equal power units can be paralleled to increase the output power (**paralleling for capacity**) or to improve the overall reliability of an UPS system (**paralleling for redundancy**).
The outputs of parallel units are connected to a common power bus, and in normal operation the units connected on the parallel bus share the *Load* equally.
The modular concept of *TLE Series* allows parallel operation of up to **6 units**, without using paralleling switchgear, external bypass circuits or common control circuitry (see *Fig. 4.3.1-1*).

Parallel units for power capacity
Several units can be paralleled in order to achieve output power greater than the maximum power of a single unit.
The maximum total power shared between the paralleled units is equal to the **total installed nominal power**.
In the event of a failure of one unit, the power supplied by the UPS system becomes insufficient and the *Load* will be transferred to the *Mains Bypass* source.

Parallel units for redundancy
The nominal power rating of the **n out of n+1** redundant paralleled modules must be equal to or higher than the required *Load* power.
The *Load* will be equally **shared by the n+1 units** connected on the output bus.
Should **one of the n+1 paralleled units** trip Off-line, **the remaining (n) modules** will supply the *Load*, maintaining conditioned power to the *critical Load*.
From this results **higher reliability and security for the *Load* plus a higher *MTBF*** (Mean Time Between Failures).

4.3.2 Features of RPA Parallel System

The *TLE Series 160 & 200 Parallel System* is designed to provide a complete ***Redundant Parallel Architecture***, and is free from common equipment.
Not only the ***Inverters*** but also the ***Bypass*** functions are redundant.

When one UPS needs maintenance or service, the *Load* is powered by the other units.

The redundant communication bus to which all units are connected keeps each unit informed about the status of all the other units.

The ***control panel*** located on each unit allows controlling and monitoring the status of this unit.

4.3.3 System control

A ***high-speed redundant, serial communication bus***, guarantees the exchange of data and thus the communication between the CPU's of each unit.

Each module controls is own function and operational status and communicates with all other modules, in order to act or react if necessary, adapting to the new conditions.

4.3.4 Synchronization

All units are identical, but one unit is arbitrarily selected as the reference and all the other units synchronize to this unit, which in turn synchronizes to the *Mains Bypass* voltage, as long as the latter is within tolerances.

In case of reference failure, another unit in the *Parallel System* is automatically chosen to take over the reference role.

The *Bypass Input* for all the units of the *Parallel System* must be supplied from the same AC source (no phase shift allowed between them).

4.3.5 Load sharing

On each unit of the *Parallel System*, *Inverter Output Voltage* and *Current* are measured and applied to a *Load* sharing bus.

An eventual difference between the units is therefore automatically equalized.

NOTE !

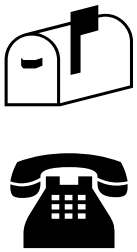
It is strongly recommended that no transformers, automatic circuit breakers or fuses should be installed between the units output and the *Load* common bus bars.

However, it is recommended that a disconnection or isolation switch is installed in order to totally isolate a unit if needed.

4.4 SERVICE AND TECHNICAL SUPPORT

For any request of technical support please contact your local ***Service Centre***.

Stamp of your local Service Centre (see page 3)



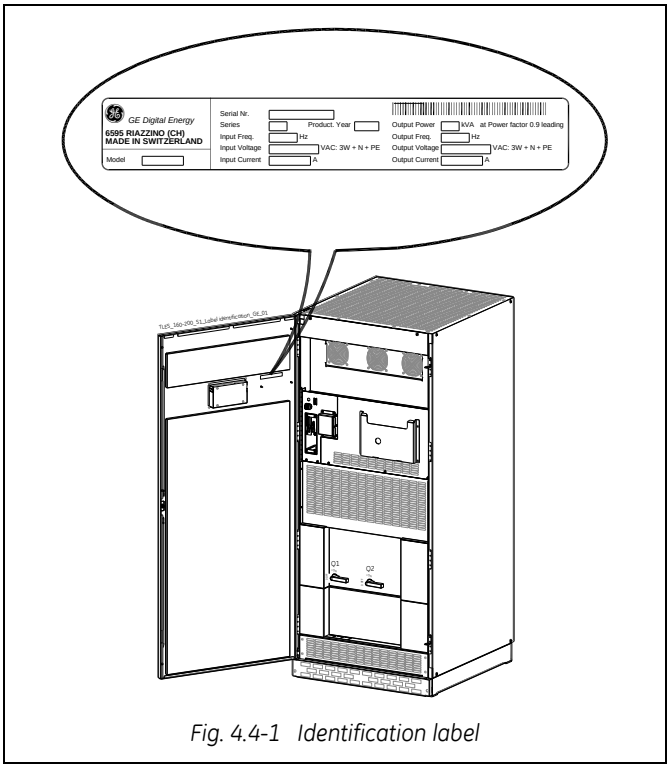


Fig. 4.4-1 Identification label

The requested data permitting to identify your UPS are marked on the ***identification label*** fixed on the front of the cabinet, behind the lower front door.

For fast and efficient technical support please mention the data marked on the identification label.

4.5 WARRANTY

GE's Critical Power, operating through its authorised agents, warrants that the standard products will be free of defects in materials and workmanship for a period as per contract specifications.

NOTE !

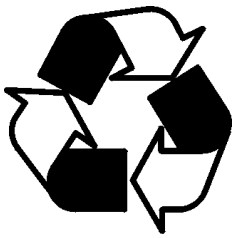
This warranty does not cover failures of the product which result from incorrect installation, misuse, alterations by persons other than authorised agents, or abnormal working conditions.

4.6 RECYCLING AT THE END OF SERVICE LIFE

NOTE !

This product has been designed to respect the environment, using materials and components respecting eco-design rules.

It does not contain CFCs (Carbon Fluor Clorid) or HCFCs (Halogen Carbon Fluor Clorid).



RECYCLING AT THE END OF SERVICE LIFE !

***GE's Critical Power*, in compliance with environment protection recommends to the *User* that the UPS equipment, at the end of its service life, must be recovered conforming to the local applicable regulations.**

BATTERY DISPOSAL

This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union.

See the product documentation for specific battery information.

The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg).

For proper recycling return the battery to your supplier or to a designated collection point.

For more information see: www.weeerohsinfo.com

5 INSTALLATION

5.1 TRANSPORT

The UPS is packaged on a pallet suitable for handling with a forklift.

The UPS must be moved in **upright position**.
Do not tilt cabinets **more than +/- 10°** during handling.

Move the UPS in its original package to the final destination site.

Do not stack other packages on top: This could damage the UPS.

If the UPS must be lifted by crane, use suitable lifting straps and spreader bars.

Forklift

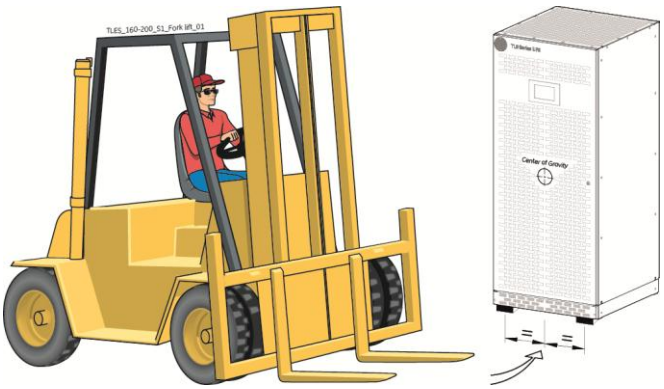


Fig. 5.1-1 Position of the forklift when moving the unpacked UPS

Crane

Fig. 5.1-2 Position of the carrying belts when moving the unpacked UPS

Forklift

The UPS may be lifted with a forklift in upright position.

Take note of the ***centre of gravity*** marked on the package.

WARNING !

Check for sufficient floor and elevator loading capacity.

Transport UPS only in upright position.

Do not stack other package on top of the UPS.

Crane

If the UPS has to be lifted by crane, use suitable carrying belts taking note of the ***centre of gravity*** marked on the package.

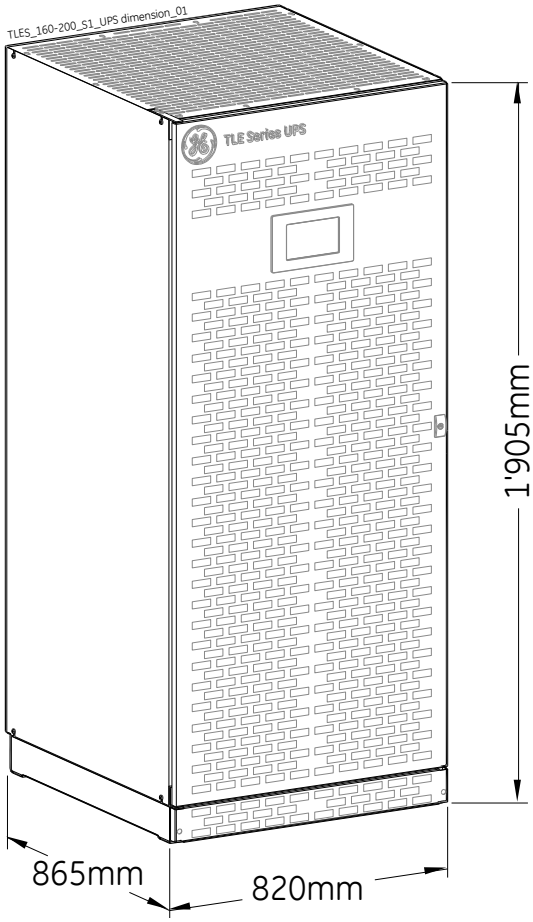
Take all necessary precautions to avoid damage to the cabinet while hoisting the UPS.

WARNING !

When loading / unloading and when moving the UPS, it is forbidden:

When loading / unloading and when moving the UPS, pay attention to:

5.1.1 Dimensions and weights TLE Series 160 & 200



Dimensions and weights *TLE Series 160 & 200*	
Dimensions (WxDxH):	820 x 865 x 1905 mm
Weight:	500 kg
Floor loading:	705 kg/m²

NOTE !

The weight of each single piece is marked outside the package!

5.2 DELIVERY

When delivered, inspect the **package integrity** and **the physical condition of the cabinets** carefully.

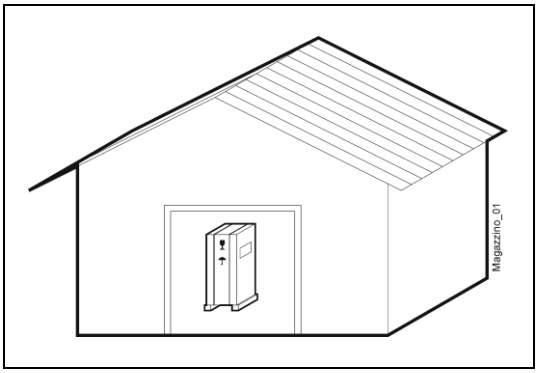
In case of any damage sustained during transport, immediately inform the carrier and contact your local ***Service Centre***.

A **detailed report** of the damage is necessary for any insurance claim.

	NOTE ! **A damaged UPS must never be installed or connected to *Mains* or *Battery*!**

5.3 STORAGE

5.3.1 Storage of the UPS



The equipment is carefully packed for transport and storage so that it is in a perfect condition when eventually installed.

Never leave an UPS outside the building and do not store the UPS one on top of the other.

We recommend to store the UPS in its original package in a dry, dust-free room, away from chemical substances, and with a temperature range not exceeding **-25°C** (-13°F) to **55°C** (131°F).
In case the battery is included please refer to *Section 5.3.2*.

Some important functions of the UPS, such as the customized functions, are defined by parameters stored in a ***RAM memory***.
A small backup *Battery* located on the Control Unit board supplies the RAM.
If the storage time of the UPS exceeds **1 year**, these functions **should be verified** by an authorized *Service Centre* before putting the UPS into operation.

5.3.2 Storage of Battery

When the delivery includes a maintenance free *Battery*, keep in mind that they are subject to self-discharge and therefore you must recharge the *Battery*.

The storage time without *Battery* recharge depends on the temperature of the storage site.

The optimal temperature for *Battery* storage is **20°C** (68°F) to **25°C** (77°F) and shall never exceed the range **-20°C** (-4°F) to **40°C** (104°F).

Recharge stored maintenance free *Battery* every:

6 months when the storage temperature is 20°C (68°F)
3 months when the storage temperature is 30°C (86°F)
2 months when the storage temperature is 35°C (95°F)

5.4 PLACE OF INSTALLATION

5.4.1 UPS location

NOTE !

UPS installation and connection must be performed by QUALIFIED SERVICE PERSONNEL only.
If optional cabinets and accessories are included with the UPS, please refer to those accompanying manuals for installation and operating instructions.

It is important to have a clean, dust-free environment provided with proper ventilation and air-conditioning to keep the ambient temperature within the specified operating range.

The recommended air inlet temperature is from **20°C** (68°F) to **25°C** (77°F) (max. 35°C / 95°F).
Refer to *Section 5.5*.

Check for sufficient **floor load capacity** before installing the UPS and the *Battery*.
Refer to *Section 5.1.1*.

For *Battery* installation follow the local codes and the recommendation of the battery supplier.

NOTE !

Temperature is very important for valve-regulated batteries (maintenance free).
Operation at temperatures higher than 25°C (77°F) will reduce battery life.

The *TLE Series 160* & *200* UPS can radiate radio frequency energy.
Although some *RFI* (Radio Frequency Interference) filtering is inherent to the UPS there is no guarantee that the UPS will not influence sensitive devices such as cameras and monitors that are positioned close by.
If interference is expected, the UPS should be moved away from the sensitive equipment.

Positioning of the UPS *TLE Series 160* & *200*

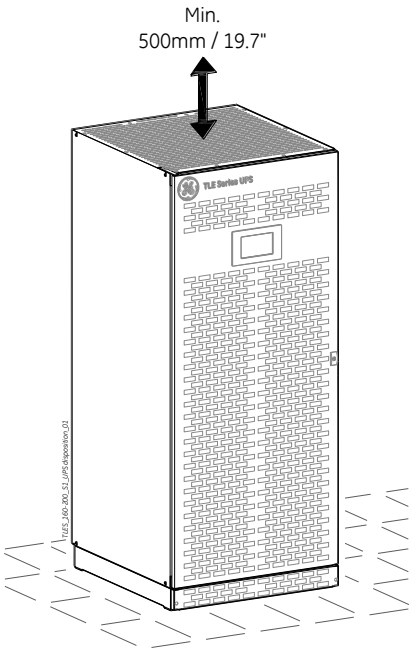


Fig. 5.4.1-1 Positioning of the UPS

The rear panel of the UPS may be mounted flush to a wall or other structure.

Clearance around the front of the unit should be sufficient to enable free passage of personnel with the doors fully open, and to allow sufficient airflow to the door vents.

To guarantee proper cooling air exhaust, the recommended minimum clearance between ceiling and top of the UPS is **500mm** (19.7").

In case of options in additional cabinets see *Section 10. – OPTIONS*.

A single-phase power outlet (230 Vac) should be provided near the UPS for connection of power tools, test equipment or connectivity devices.
This outlet must be grounded.

TLE Series 160 & 200 - Opening for input and output cable connections

TLE Series 160 & 200 provided an opening on the bottom of the cabinet for the connection of input and output cables.

Pay attention to the position of this opening when choosing the placement of the UPS.

The option *"Top Entry Cables Cabinet"* allows the connection of input and output cables from the top of the UPS.
See *Section 10 – Options*.

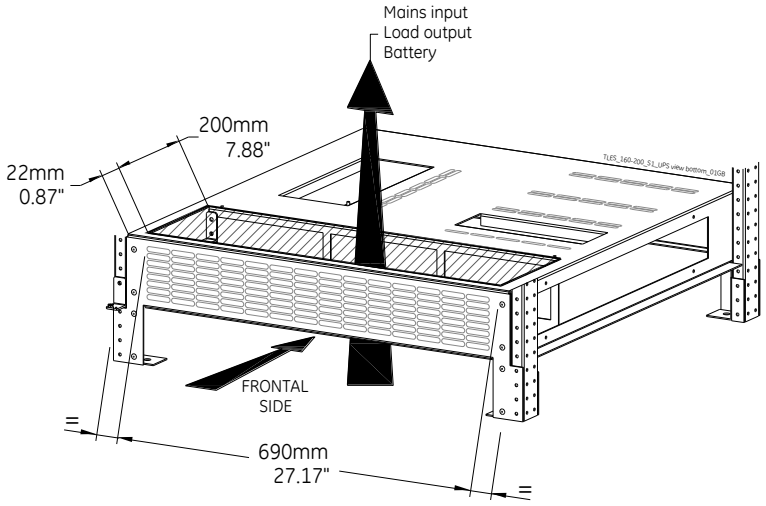


Fig. 5.4.1-2 Openings on the bottom of the cabinet for input and output cable connections

Fixing of the UPS cabinet *TLE Series 160 & 200* on the floor

The UPS cabinet is free standing and normally does not require to be bolted to the floor.

The UPS cabinet can be fixed however to the floor by bolting it with the supporting blocks to the floor.

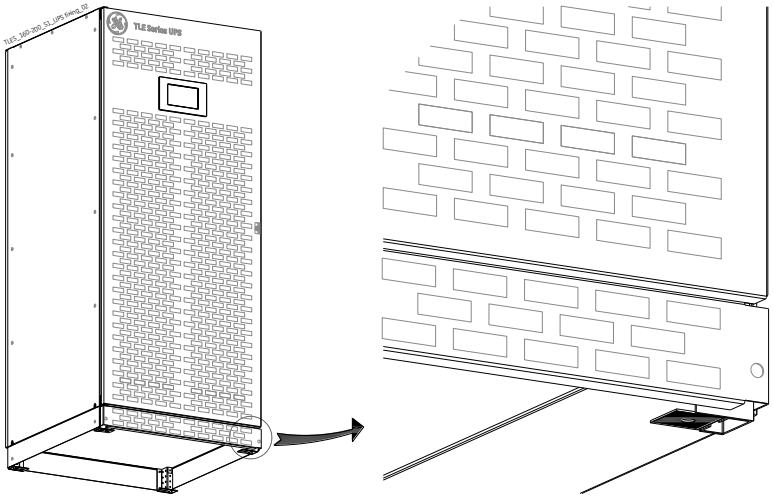


Fig. 5.4.1-3 Fixing of the UPS cabinet on the floor

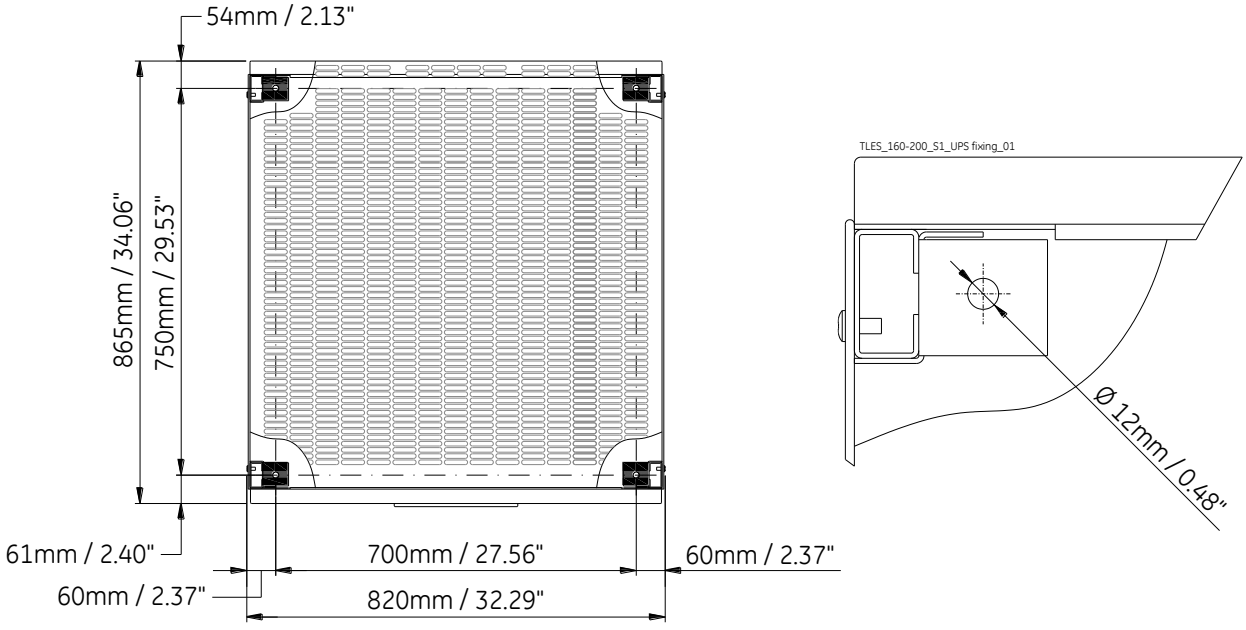


Fig. 5.4.1-4 UPS cabinet floor fixing points

RPA

Redundant Parallel Architecture

In case of *Parallel System*, try to place the UPS modules in sequence of their numbers (marked on the packing).

If the units are positioned "*side by side*", the side panels must be mounted on all units.

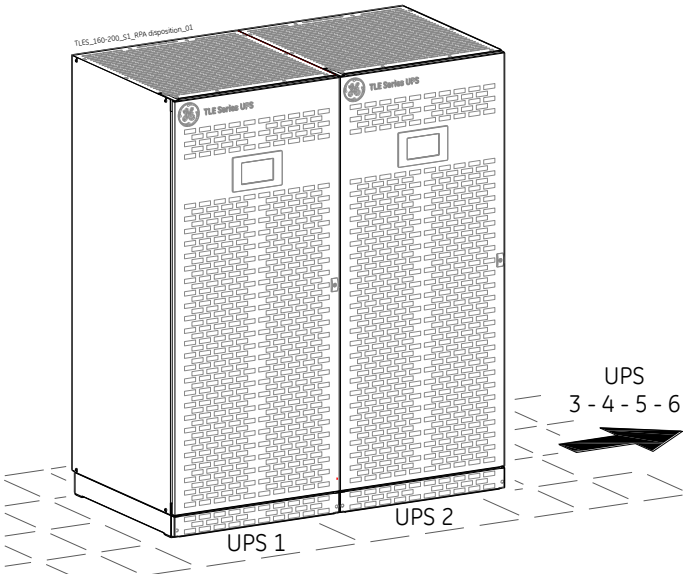


Fig. 5.4.1-5 RPA Parallel System disposition

5.4.2 Battery location

Batteries require a well-ventilated room with controlled temperature to obtain reliable operation.

The *Battery* can be install immediately adjacent to the UPS (left or right side) or remotely from the UPS. If the *Battery* is installed remotely from the UPS, a wall mounted DC disconnect device must be installed within line-of-site to both the UPS and the *Battery*.

The optimal room temperature for the *Battery* is **20°C (68°F)** to **25°C (77°F)** and shall never exceed the range **-20°C** (-4°F) to **40°C** (104°F).

The life of valve-regulated batteries will be reduced by 50% for each additional **10°C** (18°F) that the *Battery* ambient temperature is above **25°C** (77°F).

The *Battery System* associated with larger UPS is usually either rack mounted or installed in multiple *Battery Cabinets*.

Installation and assembly must be made according to the local standards and *Battery System* manufacturer's recommendations.

The *Battery Circuit Breaker* or *Battery Fuse Box* must be mounted as near as possible to the *Battery*.

WARNING !

***Battery* installation and connection must be performed by qualified personnel only.**

Read all safety instructions before proceeding with the installation (see Section 1).

Battery discharging and/or charging activities may cause the emission of hydrogen gas; therefore, the room requires proper ventilation and fresh air. Comply with the EN50272-2 standard.

5.5 VENTILATION AND COOLING

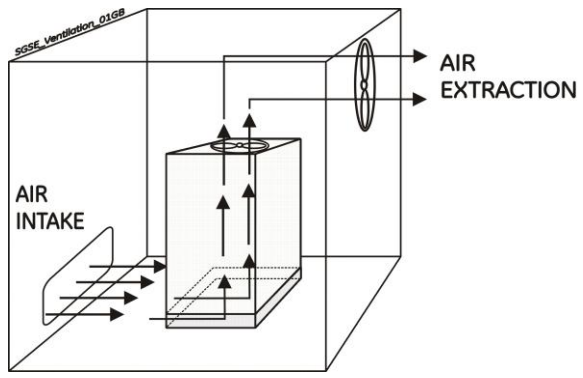


Fig. 5.5-1 Installation on plain floor

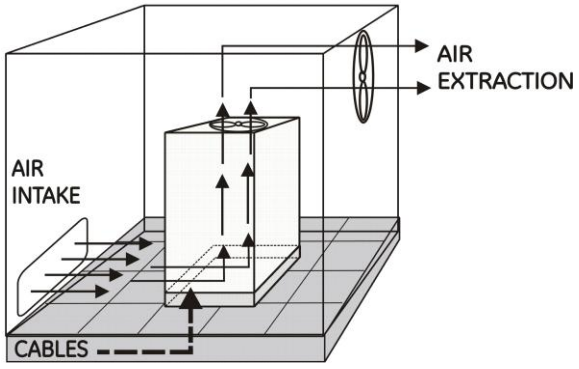


Fig. 5.5-2 Installation on raised floor

The heat produced by the UPS is transferred to the environment by its ventilation.

Air inlets for UPS ventilation are located on the front of the UPS, while air outlets are on top of the cabinet.

A suitable ventilation or cooling system must be installed to extract the heat from the UPS room.

NOTE !

Do not put anything on the top of the cabinet.

Air filtering systems could be required when the UPS operates in a dirty environment.

In order to prevent overheating of the UPS, the available air intake flow rate must exceed the total air exhaust flow rate requirement of the UPS system.
Contact your ***Dealer*** or the nearest ***Service Centre*** for appropriate solutions.

The below table indicates the heat dissipation at full *Load* at ***PF = 0.9 & 1*** and charged *Battery*, up to **1000 m** (3280 ft) altitude, for cooling air **25°C** (77°F) to **30°C** (86°F).

UPS model	Losses				Cooling air flow			
	VFI		*eBoost™ (option)*		*VFI*		*eBoost™ (option)*	
	PF = 0.9	*PF = 1*	*PF = 0.9*	*PF = 1*	*PF = 0.9*	*PF = 1*	*PF = 0.9*	*PF = 1*
TLE Series 160	5.3 kW	5.9 kW	1.4 kW	1.6 kW	1546 m³/h	1721 m³/h	409 m³/h	467 m³/h
TLE Series 200	6.7 kW	7.4 kW	2.9 kW	3.2 kW	1955 m³/h	2159 m³/h	846 m³/h	934 m³/h

NOTE !

Even when *eBoost™ Operating Mode* option is available, the ventilation and cooling system shall be rated as for operation in *VFI mode*

5.6 UNPACKING

Move the equipment in it's original packing, carton box or wooden case, until the place of installation and remove the packing and the transport sockets only just before installing the UPS.

Be aware of the heavy weight of the UPS, pay attention when moving the UPS cabinet.

White colour = without any anomaly
Red colour = anomaly evidence

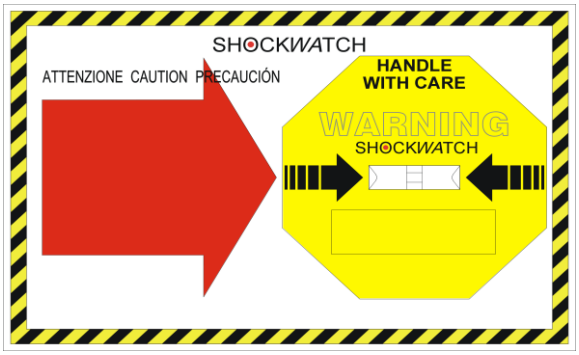


Fig. 5.6-1 ShockWatch device

Fig. 5.6-2 TiltWatch device

The package of the *TLE Series 160 & 200* is equipped with *ShockWatch* (indicator for shock), and *TiltWatch* (indicator for overthrow) on the outside.

These devices indicate an eventual shock or overthrow during transport.

Whenever these devices show a possible anomaly, the UPS shall not be commissioned before consulting a *"Service Centre"*.

NOTE !

Be aware of the heavy weight of the UPS, pay attention when moving the UPS cabinet.

Take care not to damage the UPS when moving by forklift.

Included in the delivery you can find the following parts:

- An accessories bag.
- Air inlet grids, which must be mounted on the bottom of the cabinet UPS with the screws included.
- Control Bus cables for inter-connecting the UPS modules (only For the RPA system).
- The documentation includes the *"Operating Manual"* and the *"UPS Safety Rules"*.

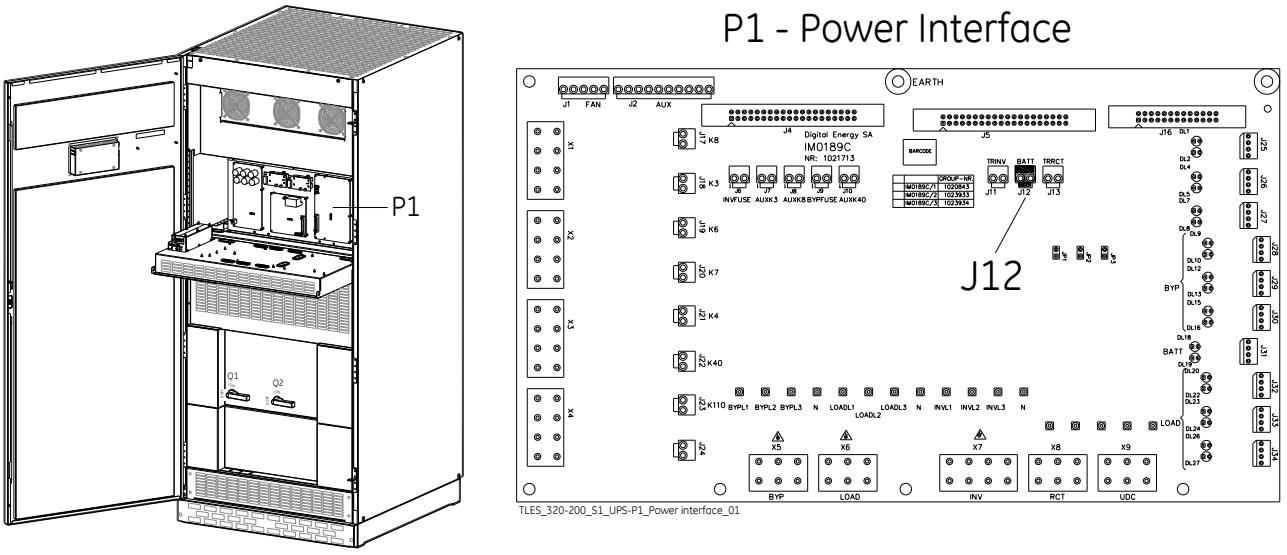


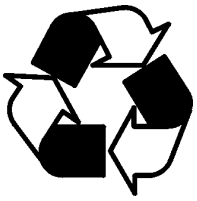
Fig. 5.6-3 P1 – Power Interface board

In addition you can find a cable (standard length: 5m) with the thermal protection sensor.
This is to compensate the battery charge voltage (only for type VRLA without maintenance) based on the working temperature.
The sensor must be mounted in the battery cabinet while plug ***J12*** must be connected to "***P1-Power Interface***".

When the sensor is disconnected, the floating voltage is calibrated for temperature = **20°C**.

If the battery cabinet is not mounted side by side of the UPS, the cable connecting the temperature sensor to the UPS should be run in a protective conduit.

	WARNING ! **Cable with the sensor installation and connection must be performed by QUALIFIED SERVICE PERSONNEL only.**

	**PACKING MATERIAL RECYCLING** ***GE's Critical Power*, in compliance with environment protection, use only environmentally friendly material.** **UPS packing materials must be recycled in compliance with all applicable regulations.**

5.7 ELECTRICAL WIRING

⚠	**WARNING !** **UPS installation and connection must be performed by QUALIFIED SERVICE PERSONNEL only.** **Refer to the "*Safety prescriptions - Installation*" described on *Section 1*.**

5.7.1 Mains input connection

⚠	**NOTE !** **Ensure that the AC and DC external isolators are OFF and locked out to prevent their inadvertent operation.** **Do not apply power to the equipment prior to the commissioning by a qualified service engineer.** **Before any other input connection, connect and check the earthing wire.**

The *Mains input* power connection can be common or separate for *Bypass supply* and *Rectifier input*, depending on the electrical system provided by the customer.

Separate mains input Rectifier & Bypass (recommended)

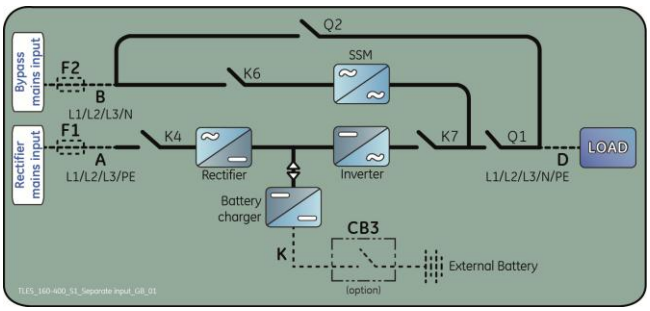


Fig. 5.7.1-1 Separate mains input Rectifier & Bypass

The *Bypass* and *Rectifier* use different power sources (***F1*** and ***F2*** inputs).

In this case, when the *Rectifier-input fuses* are opened, the *Automatic Bypass* and the *Manual Bypass* are supplied by the other connection.

⚠	**In this case, the interconnection links *BR1*, *BR2* and *BR3* (option) on the input bus bars MUST NOT BE CONNECTED.**

Common mains input Rectifier & Bypass (option)

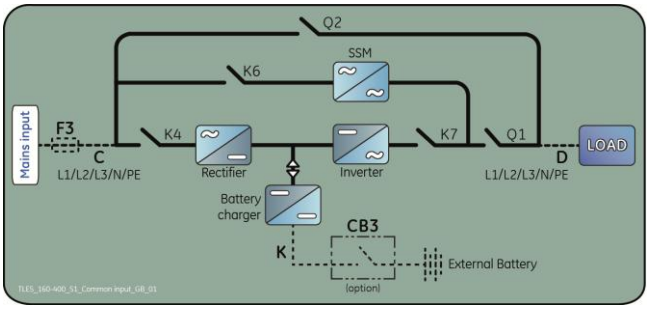


Fig. 5.7.1-2 Common mains input Rectifier & Bypass (option)

The **same power source** is to be used for both *bypass supply* and *Rectifier input* (input ***F3***).

Bear in mind that when the *Mains fuses* are opened there is a supply failure to the *Rectifier* as well as to the *bypass* and *Manual Bypass switch*.

⚠	**In this case, the interconnection links *BR1*, *BR2* and *BR3* (option) on the input bus bars MUST BE CONNECTED. See *Fig. 5.8.2-1*.**

5.7.2 Input/output over current protection and wire sizing

NOTE !

The UPS is designed for TN System.
The input neutral shall be grounded at source and shall never be disconnected.

4 pole breaker shall not be used at the UPS input (see also IEC 60364, IEC 61140, IEC 61557).

The cabling of the UPS system has to be sized according to the UPS power rating.
Exceptions are only allowed to suit local prescriptions.
Sizing of circuit *breakers*, *fuses* and *cables* for *input mains*, *output load* and *battery* must meet the requirements of local and national electrical codes.

Before connecting the UPS, verify that the *mains voltage* and *frequency*, the *output load voltage* and *frequency* and *battery data* (cells number, floating voltage, autonomy) are according to the required data.

The protection of the UPS mains input must be exclusively with 3 pole breakers.
Disconnection of the Neutral is not permitted.
The UPS needs the connection of the Neutral to the input, to guarantee the function in TN mode (Neutral-Earth).

Caution when using *four-pole circuit breakers* as protection to the *UPS Load*.
A potential problem exists for situations with *non-linear Loads*, causing the *neutral current* to be higher than the *phase current*.

Avoid to run the *input cables* in parallel with the *output cables* to prevent them from noise induction.

The *three-phase Mains power* supply must be symmetrical with respect to earth, due to the existence of voltage surge protection devices inside the UPS.

The connection of the *Battery* to the UPS must be protected with *fuses* or similar devices according to technical specifications and in accordance with local standards.

NOTE !

If you use *ELCB breakers* to protect the input connections, consider the high leakage current towards the earth generated by the noise suppression capacitors.

If these *ELCB breakers* are strictly necessary, we suggest to use the largest type suitable for non-linear current and for delayed operation.

To ensure the circuit selectivity in case of ***short- circuit in the load equipment***, special care must be taken in choosing the ***fuse or circuit breaker ratings*** installed in the output distribution circuits.

Due to the relatively low short-circuit capability of the *UPS Inverter*, a short-circuit in the *Load* will cause an immediate transfer to *Mains*.
The *largest fuse* in the output distribution should be **at least 1.6 time** smaller than the *fuses* supplying the *bypass line*.

If circuit selectivity is required while the *Load* is fed from the *Inverter* (*Bypass Mains* not available), the *largest fuse* or *circuit breaker* should be rated at no more than **20%** of the *UPS output current rating*.

Separate mains input Rectifier & Bypass

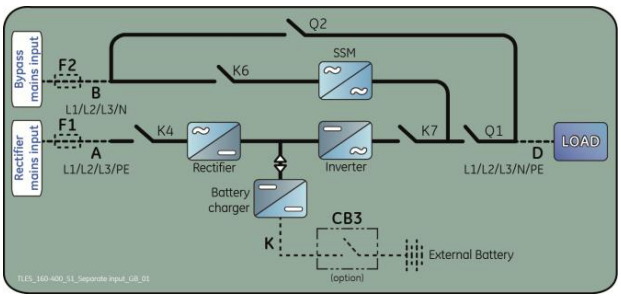


Fig. 5.7.2-1 Separate mains input Rectifier & Bypass

Common mains input Rectifier & Bypass

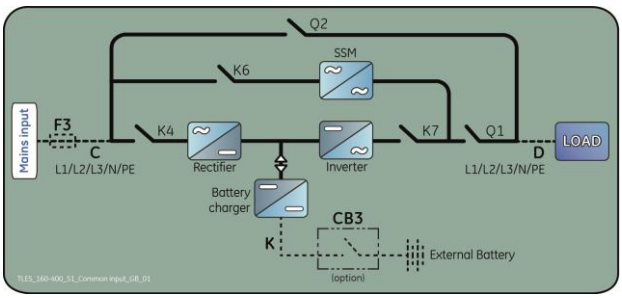


Fig. 5.7.2-2 Common mains input Rectifier & Bypass

Fuses AgL / circuit breakers (3x380/220V, 3x400/230V, 3x415/240V)				
UPS model	**F1**	**F2**	**F3**	**MCB**
TLE Series 160	3 x 250A	3 x 250A	3 x 250A	FKN36NTN630PF (impostato a 500A)
TLE Series 200	3 x 315A	3 x 315A	3 x 315A	FKN36NTN630PF (impostato a 630A)

Cables section (mm²) A, B, C, D, K / Recommended by European Standards (EN)				
UPS model	**A**	**B**	**C &D**	**K**
TLE Series 160	3x120 + 70	4x120	4x120 + 70	2x240 + 120
TLE Series 200	3x150 + 95	4x150	4x150 + 95	2x(2x120) + 120

Cables section (mm²) A, B, C, D, K / Recommended in Switzerland				
UPS Model	**A**	**B**	**C &D**	**K**
TLE Series 160	3x150 + 95	4x150	4x150 + 95	2x(2x95) + 95
TLE Series 200	3x185 + 95	4x185	4x185 + 95	2x(2x150) + 150

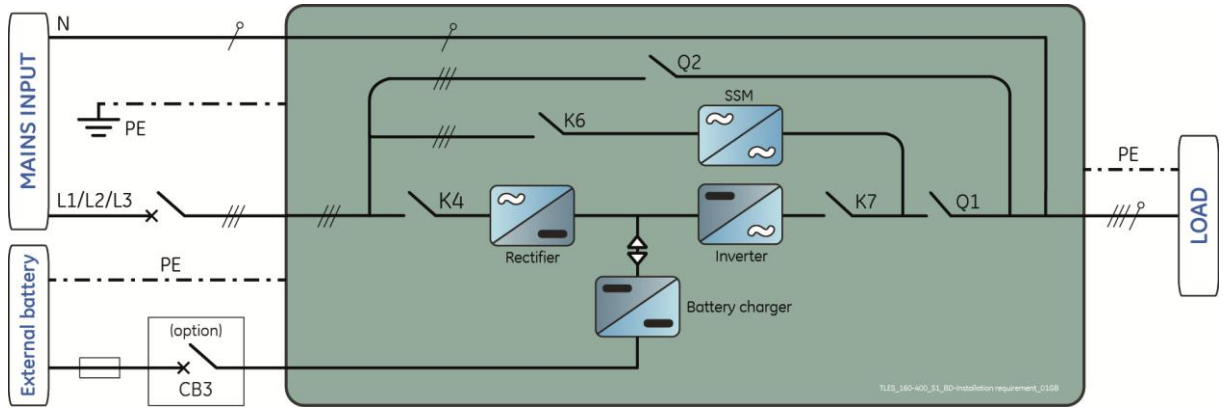
NOTE !

The delivery and installation of fuses and input/output connections of the UPS are at the customer's expense, unless agreed otherwise.

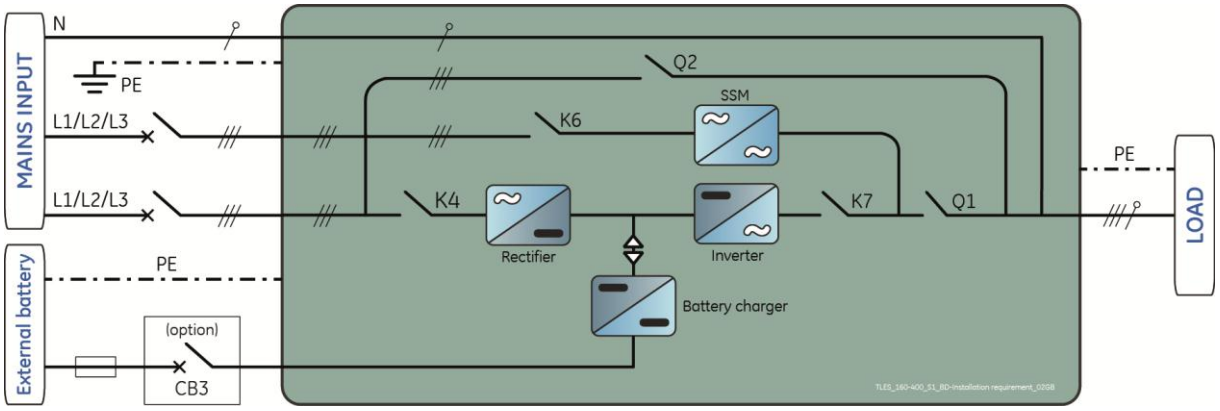
5.7.3 Installation requirements

Typical examples for the connection of the *TLE Series 160 & 200*.

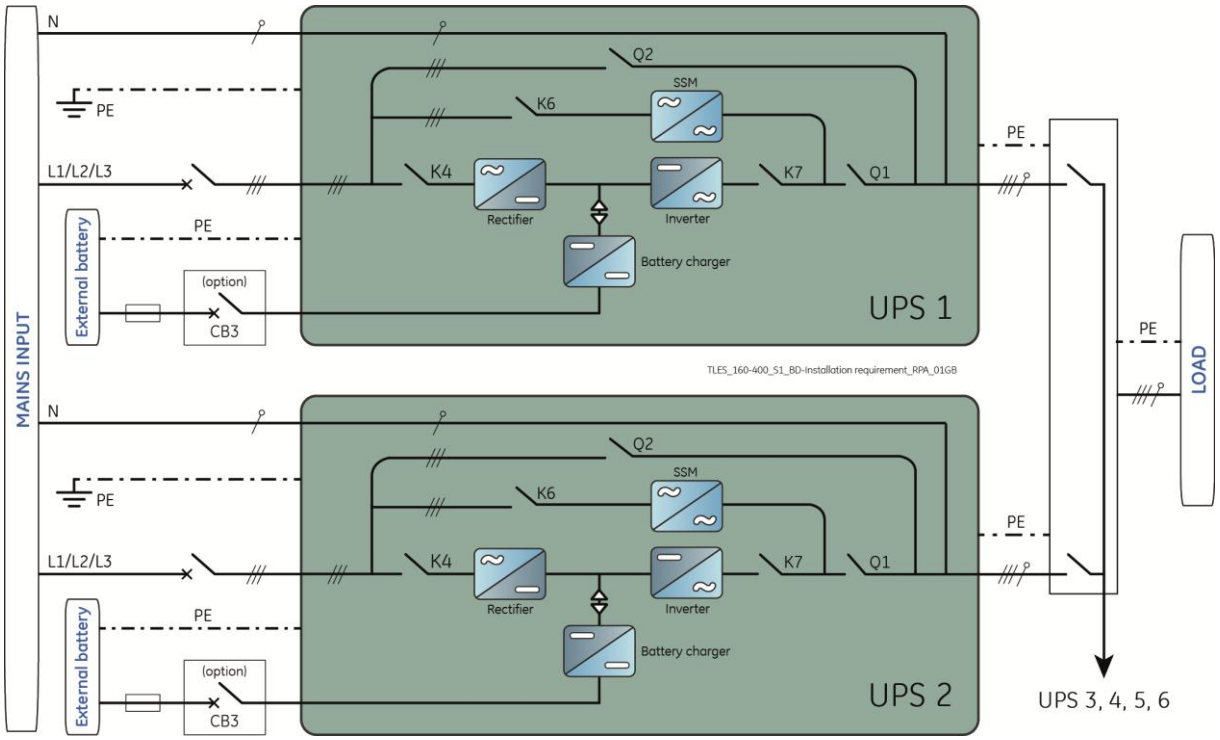
Single UPS with Common Mains Input for Rectifier & bypass



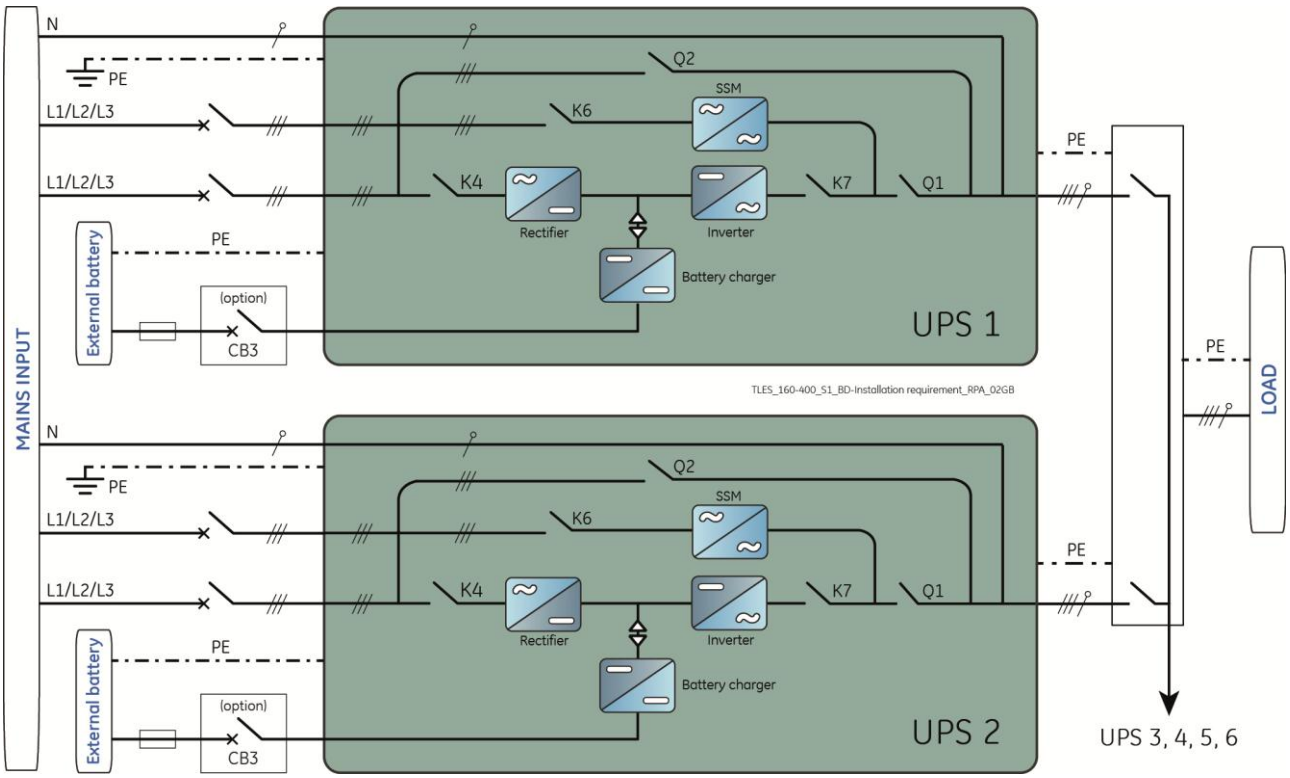
Single UPS with Separate Mains Input for Rectifier & bypass



UPS Parallel System with Common Mains Input Rectifier & bypass



PS Parallel System with Separate Mains Input for Rectifier & bypass



5.8 ELECTRICAL CONNECTION

WARNING !

UPS installation and connection must be performed by QUALIFIED SERVICE PERSONNEL only.
Refer to the "*Safety prescriptions - Installation*" described on *Chapter 1*.

In case of UPS equipped with options or customized parts not covered by this manual, please consult the appropriate technical documentation before proceeding with electrical connections.

Carefully read the following recommendations before proceeding:

- Ensure that the *AC* and *DC* external isolators are Off, and prevent their inadverted operation.
- Do not close any external isolators prior to the commissioning of the equipment.
- The input/output cables must be put in order and fixed, taking care to avoid risk of short-circuit between different poles.
- The earthing and neutral connection of the electrical system must be in accordance with local regulations.
- In case of additional cabinets containing input/ output transformers, etc, the earth must be connected to the UPS main earth.
- Once the power cables have been connected, re-install the internal safety shields and close the cabinets by re-installing all external panels.

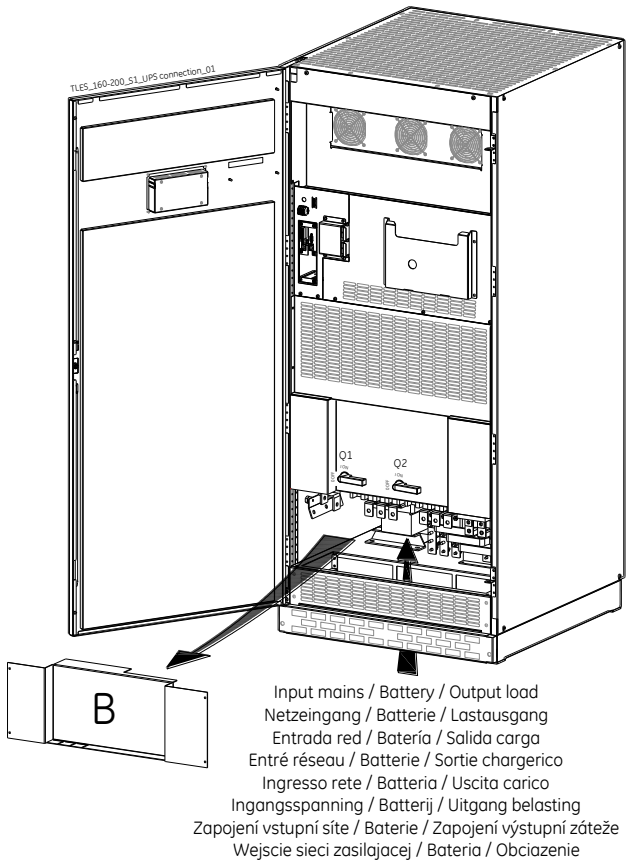

TLES_160-200_S1_UPS connection_01
Q1
Q2
B
Input mains / Battery / Output load
Netzeingang / Batterie / Lastausgang
Entrada red / Batería / Salida carga
Entré réseau / Batterie / Sortie chargerico
Ingresso rete / Batteria / Uscita carico
Ingangsspanning / Batterij / Uitgang belasting
Zapojení vstupní síte / Baterie / Zapojení výstupní záteže
Wejscie sieci zasilajacej / Bateria / Obciazenie

Fig. 5.8-1 Access to connection bus bars

Access to the bus bars for the cable connections

To access *Input, Output and Battery connections* proceed as follows:

- Remove the front protection panel "***B***".

NOTE !

For UPS correct operation, the input mains phase rotation must be clock-wise.

5.8.1 TLE Series 160 & 200 - Power connection with common input mains (option)

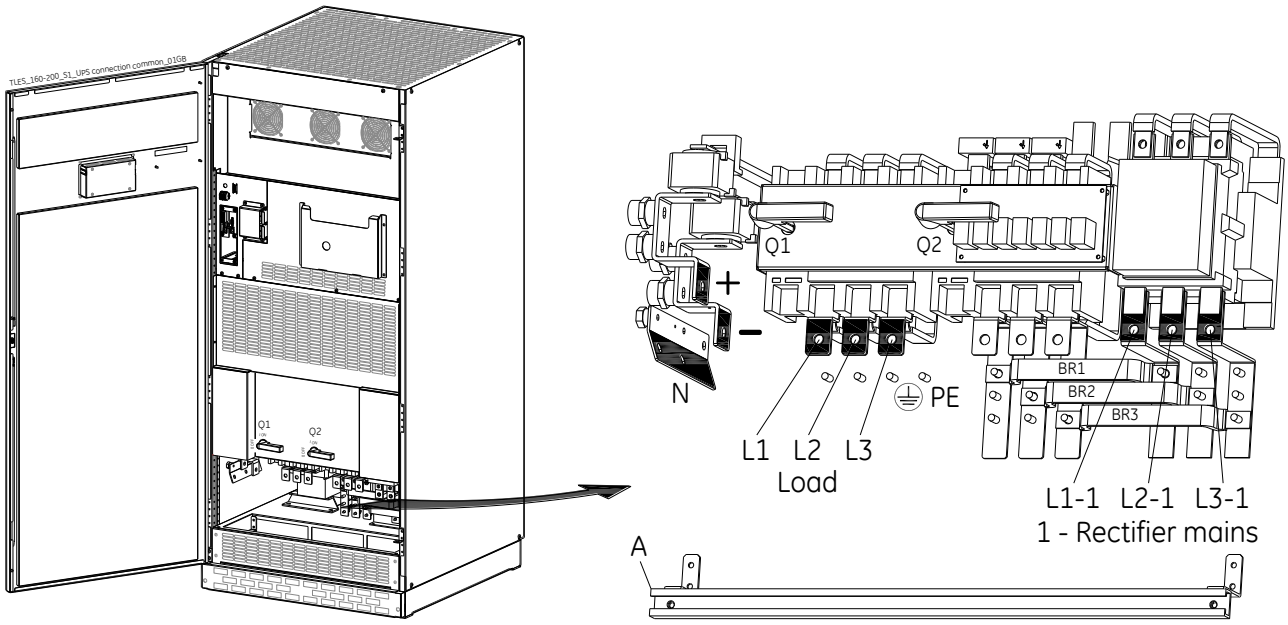


Fig. 5.8.1-1 Power connection with common input mains (option)

Power connection cables are connected to bus bars using **M10 bolts**.
The bolts of the connection cables must be tightened with a torque wrench at **40Nm**.
Fix the cables on accessory "***A***" with the enclosed cable ties.

Common Input Mains - Rectifier / Bypass			
L1-1	Rectifier + Bypass Phase L1		
L2-1	Rectifier + Bypass Phase L2	**N**	Neutral
L3-1	Rectifier + Bypass Phase L3	**PE**	Ground

NOTE !
The interconnection links *BR1*, *BR2* and *BR3* (option) on the input bus bars MUST BE CONNECTED (see *Fig. 5.8.1-2*).

Output Load					
L1	Load phase L1	**L2**	Load phase L2	**L3**	Load phase L3
N	Neutral	**PE**	Ground		

External Battery connection	
+	Positive pole of the battery
-	Negative pole of the battery
PE	Battery cabinet ground

UPS PARALLELED ON THE SAME BATTERY:
This configuration is not possible for *UPS Parallel System TLE Series 160 & 200*.
Before closing the *"external battery fuses"*, verify for correct polarity of the battery connection.

NOTE !
To meet standards concerning electromagnetic compliance, the connection between the UPS and external *Battery* must be done by using a shielded cable or suitable shielded (steel) conduit!
This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.
If the UPS is equipped with an input bypass transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded.

Installation notices in case of power connection with *Common Input Mains* (option)

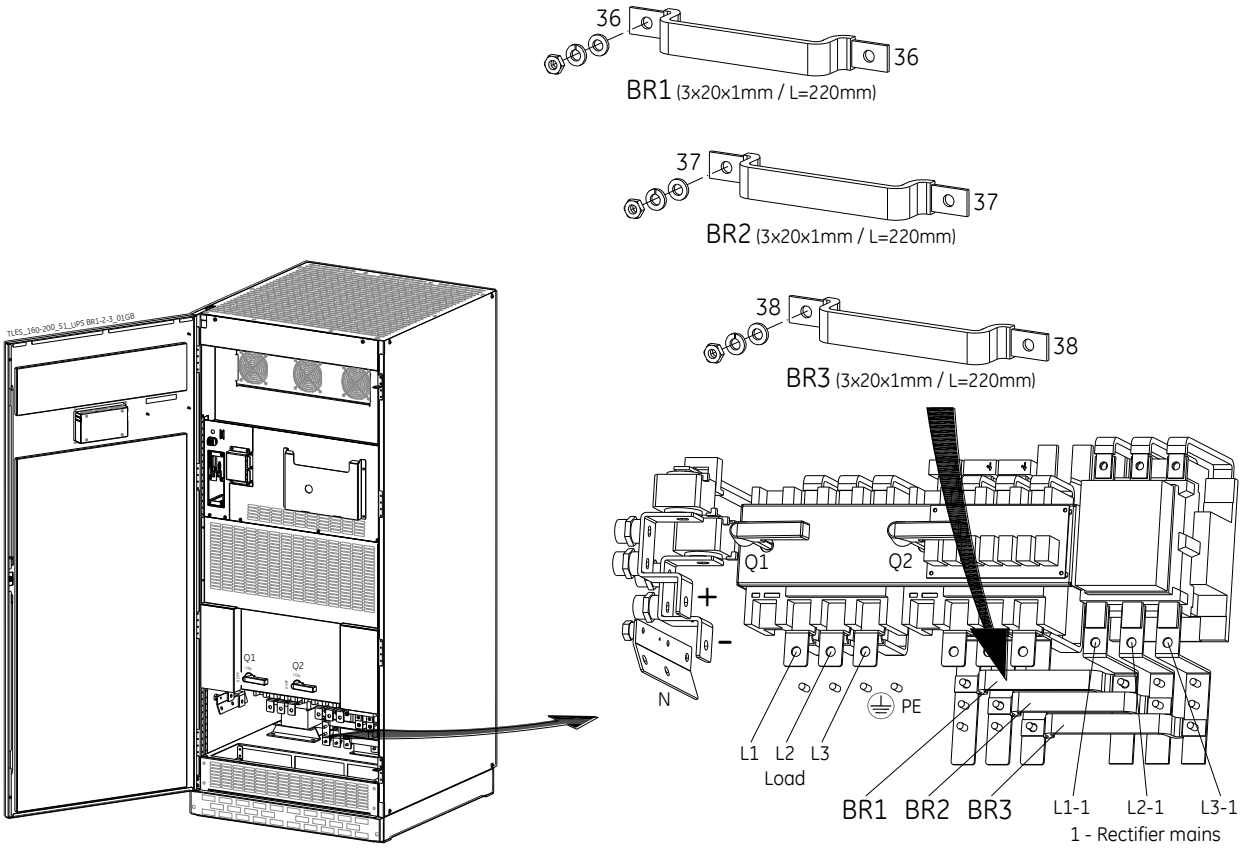


Fig. 5.8.1-2 Interconnection links BR1, BR2 and BR3 (option)

⚠	**NOTE !** **The interconnection links *BR1*, *BR2* and *BR3* (option) on the input bus bars MUST BE CONNECTED (see *Fig. 5.8.1-2*).**

Bolts dimension of the interconnection links *BR1*, *BR2* and *BR3:* **M8**.
The bolts of the connection interconnection links must be tightened with a torque wrench at **22Nm**.

Connection	**From**	**To**
Flexible bars - 36	L1-1 (Rectifier mains)	L1-2 (Bypass mains)
Flexible bars - 37	L2-1 (Rectifier mains)	L2-2 (Bypass mains)
Flexible bars - 38	L3-1 (Rectifier mains)	L3-2 (Bypass mains)

5.8.2 TLE Series 160 & 200 - Power connection with separate input mains

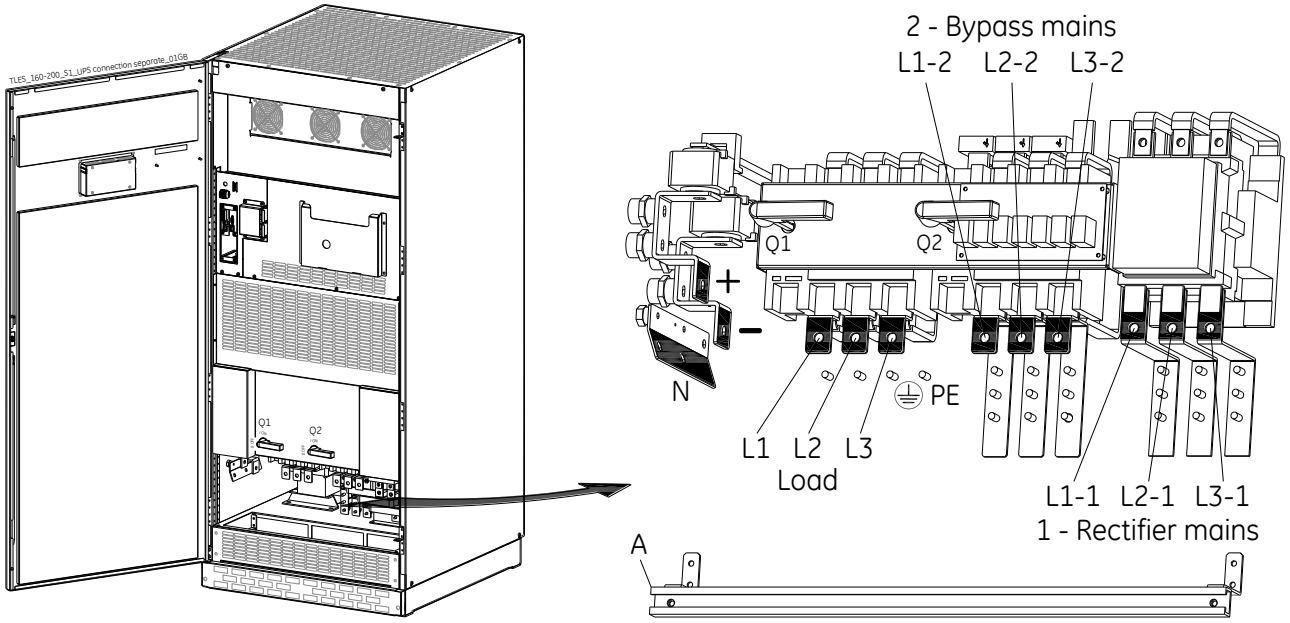


Fig. 5.8.2-1 Power connection with separate input mains

Power connection cables are connected to bus bars using **M10 bolts**.
The bolts of the connection cables must be tightened with a torque wrench at **40Nm**.
Fix the cables on accessory "***A***" with the enclosed cable ties.

Separate Input Mains - Rectifier / Bypass			
L1-1	Rectifier phase L1	**L1-2**	Bypass phase L1
L2-1	Rectifier phase L2	**L2-2**	Bypass phase L2
L3-1	Rectifier phase L3	**L3-2**	Bypass phase L3
PE	Ground	**N**	Neutral

NOTE !
The interconnection links *BR1*, *BR2* and *BR3* (option) on the input bus bars MUST NOT BE CONNECTED (see *Fig. 5.8.1-2*).

Output Load					
L1	Load phase L1	**L2**	Load phase L2	**L3**	Load phase L3
N	Neutral	**PE**	Ground		

External Battery connection	
+	Positive pole of the battery
-	Negative pole of the battery
PE	Battery cabinet ground

UPS PARALLELED ON THE SAME BATTERY:
This configuration is not possible for *UPS Parallel System TLE Series 160 & 200*.
Before closing the *"external battery fuses"*, verify for correct polarity of the battery connection.

NOTE !
To meet standards concerning electromagnetic compliance, the connection between the UPS and external *Battery* must be done by using a shielded cable or suitable shielded (steel) conduit!
This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.
If the UPS is equipped with an input bypass transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded.

5.8.3 Use of TLE Series 160 & 200 in eBoost™ Operation Mode

NOTE !

For systems intended to be operated in *eBoost™ Operation Mode*, the installation shall be protected with suitable surge protection devices (SPDs) on the AC bus feeding the UPSs.

Please contact your *Service Centre* for more information.

NOTE !

If an emergency generator set supplies the UPS in case of *Mains Failure*, and the system is intended to be operated in *eBoost™ Operation Mode*, *eBoost* operation shall be prevented during generator operation.

This can be accomplished by either installing a "*GENERATOR ON*" signal (refer to *Section 9.2.5)* or an "*eBoost/IEMi CONTROL*" signal (refer to *Section 9.2.7)*.

5.8.4 Use of TLE Series 160 & 200 as frequency converter

When the *TLE Series 160 & 200* is utilized for **different output frequency compared to the input frequency**, the *Automatic Bypass* and *Manual Bypass* functions are disabled, therefore the *Load* cannot be transferred to *Mains* in case of overload, short circuit, or inverter failure.

In situations where the UPS needs to be powered down for maintenance purposes, the critical *Load* must also be powered down during this time.

The UPS cannot be transferred to *Manual Bypass*, as serious damage to the *Load* could be the result.

When the set-up parameters of the UPS are set for *frequency converter*, the ***eBoost™ Operation Mode*** is automatically disabled.

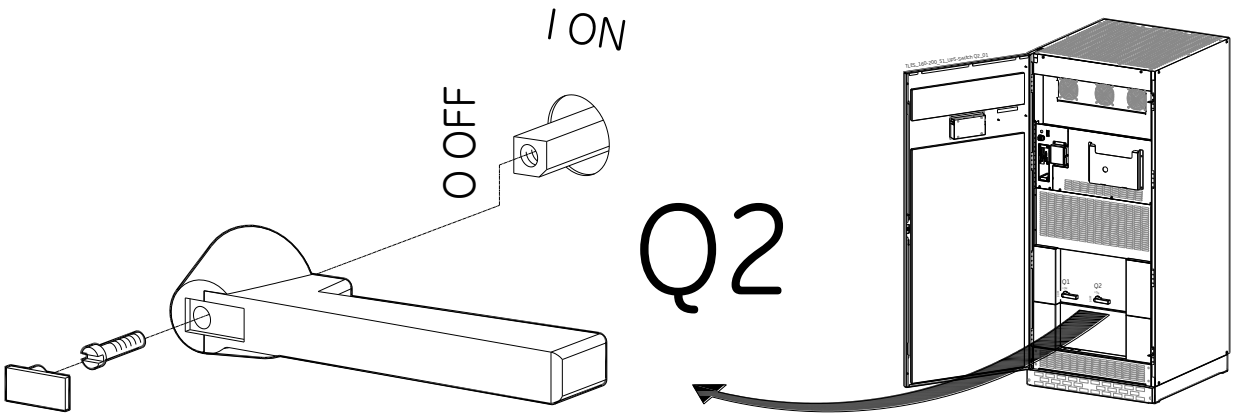


Fig. 5.8.4-1 Switch Q2 – Manual Bypass

When the UPS is used as a frequency converter, the circuit breaker *Q2 - Manual Bypass* should be removed to avoid any accidental closure. See *Fig. 5.8.4-1*.

In order to avoid improper operation, only the *Rectifier input* should be powered (***L1-1, L2-1*** and ***L3-1*** */ Fig. 5.8.1-1)*, therefore ***BR1, BR2*** and ***BR3*** (option), on the input bus bars **MUST NOT BE CONNECTED**. See *Fig. 5.8.1-2*.

Special care must be taken in choosing the **fuse ratings** installed in the output distribution **(max. 20% of the UPS rated current)**.
Avoid high inrush current due to transformer magnetisation or motor starting.

	NOTE ! **At site only a QUALIFIED SERVICE ENGINEER may change a unit, initially delivered as a frequency converter, into a normally operating "standard" UPS.**

RPA
Redundant Parallel Architecture

5.9 RPA PARALLEL SYSTEM CONNECTION

WARNING !

This operation must be performed by trained personnel before the initial start-up (ensure that the UPS installation is completely powered down).

5.9.1 Power wiring of parallel units

To guarantee good *Load* sharing between the units of a *Parallel System*, we recommend that the cable length from the input distribution board (5) to the output distribution board (9) is equal for each unit (a+b = c+d = e+f = g+h = i+l = m+n = o+p = q+r).
Tolerance: **+/-10%**.

The AC input power of the *Bypass* must be the same for all units of the *Parallel System* - no phase shift allowed between units.

NOTE !

It is strongly recommended that no transformers, automatic circuit breakers or fuses should be inserted between the unit's output and the *Load* common bus bars.

However, it is recommended that a disconnection or isolation switch is installed in order to totally isolate a unit if needed.

Verify that power wiring and control wiring run in separate conduits or cable trays.
The power wiring requires two separate conduits: one for input and one for output cables.

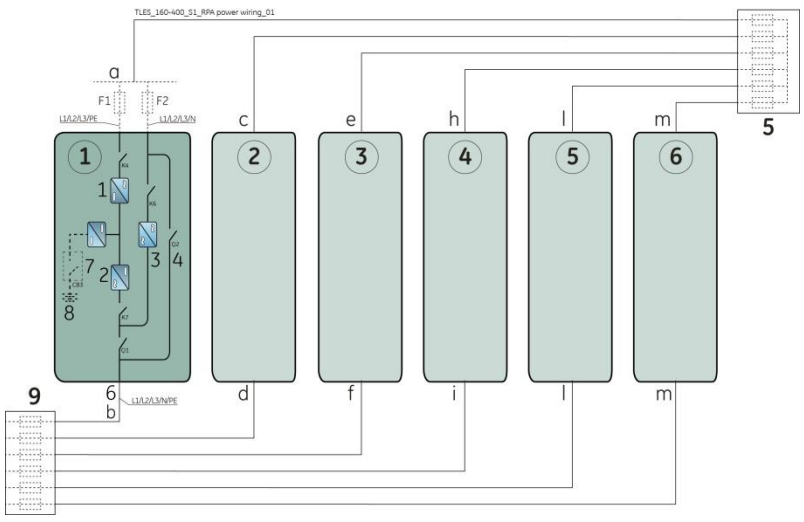


Fig. 5.9.1-1 Power wiring of RPA Parallel System

1 = Rectifier
2 = Inverter
3 = Automatic Bypass
4 = Manual Bypass
5 = Input Mains Distribution
6 = Unit Output Load
7 = External Battery MCB
8 = External Battery
9 = Common bus bar and Output Load Distribution
① = UPS number 1
② = UPS number 2
③ = UPS number 3
④ = UPS number 4
⑤ = UPS number 5
⑥ = UPS number 6

5.9.2 Parallel control bus connection

In case of *Parallel System*, the communication between the units takes place through the ***Control Bus Cables***.

Each *Parallel Unit* contains the two boards "***P13/P14 – IM0022 – Bus Interface Board***" (mounted on top of the board "***P12 – IM0196 – RPA Board***") on which four connectors ***J1A - J2A*** and ***J1B - J2B*** are allocated.
All the parallel units are connected to the same control bus.

This connection allows:

- The microprocessors of each unit to communicate with each other.
- The oscillators of each unit to be locked together.
- The regulation loops to compare the output current of each unit in order to equally share the *Load* current.

For increased reliability, this connection is made with redundant cables.
In this way, communication is maintained between units in case one of the control cables should fail or be accidentally damaged or disconnected.

The standard length of the control bus cable between two parallel units is **12m / 40 ft**.
The maximal overall length of bus connection, between the first and the last unit, should not exceed **90m / 295 ft**.
Verify that control wiring run in an individual separate steel conduit.

NOTE !

Under no circumstance should the control bus cable connecting *J1A - J2A (1/2/3/4/5)* and *J1B - J2B (1/2/3/4/5)* be connected or disconnected after the system has been powered On.

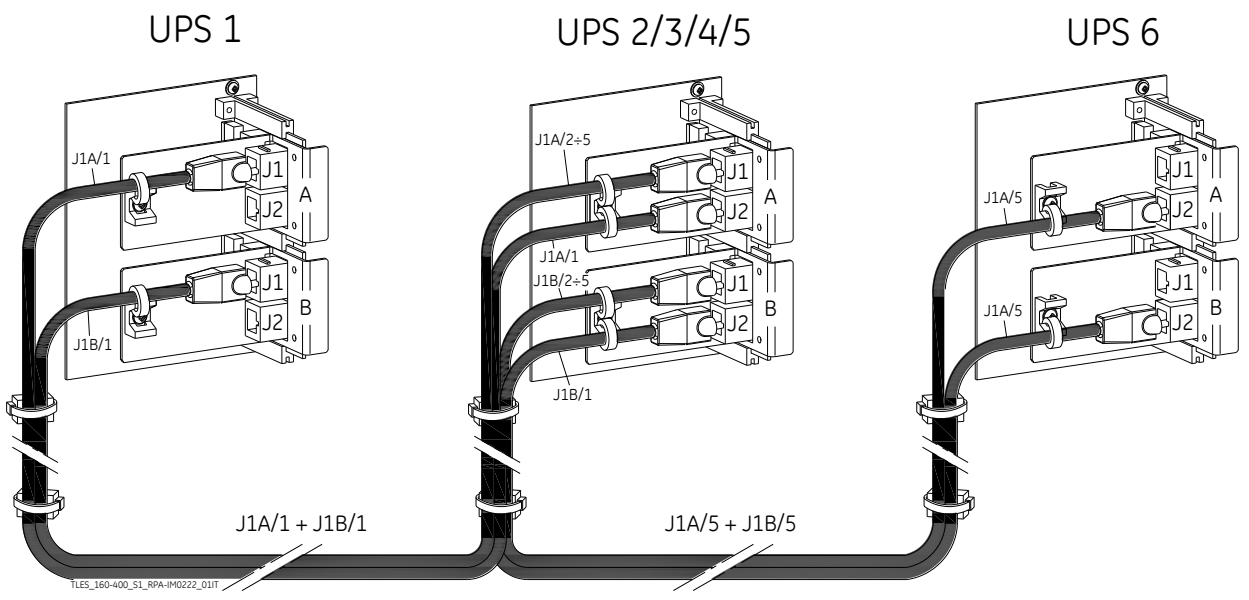


Fig. 5.9.2-1 RPA System - Control bus connection

It is important to place the units in sequence of their assigned number.
A unit number from ***1*** to ***6*** is defined by the setting of parameters and displayed on the panel (***1*** to ***6***).
This number is also marked inside and outside the packaging.

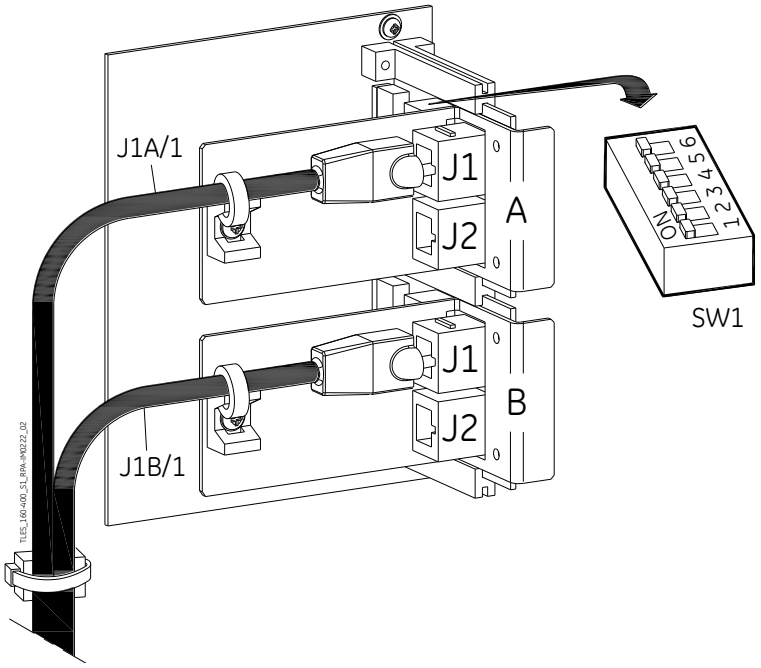


Fig. 5.9.2-2 Bus connection on first and last units

Final units, first and last, of a RPA Parallel System

On the two boards *P13/P14 – IM0022 – Bus Interface Board*, of the first and last units of a *Parallel System*, the switches *SW1-1/2/3/4/5/6* **MUST BE IN POSITION ON** (see *Fig. 5.9.2-2*).

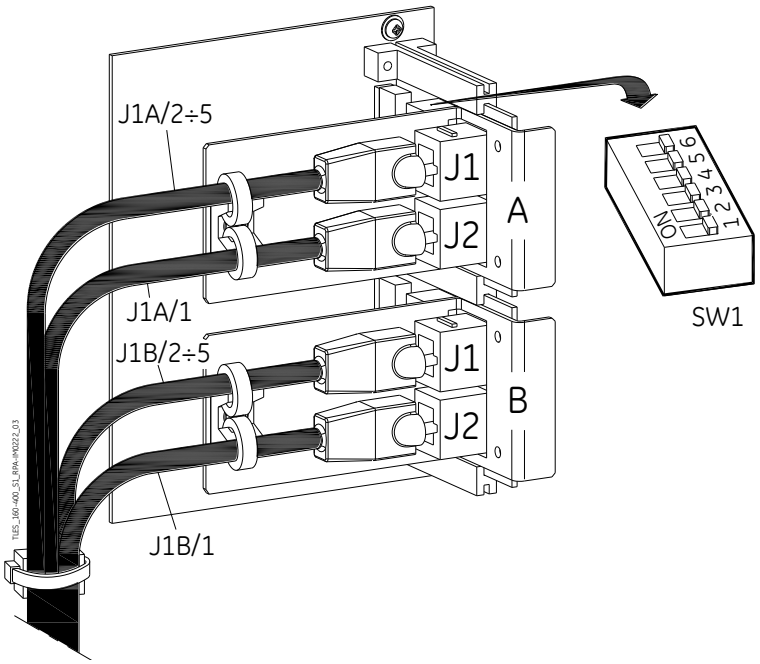


Fig. 5.9.2-3 Bus connection on intermediate units

Intermediate units of a RPA Parallel System

On the two boards *P13/P14 – IM0022 – Bus Interface Board*, of the intermediate units of a *Parallel System*, the switches *SW1-1/2/3/4/5/6* **MUST BE IN POSITION OFF** (see *Fig. 5.9.2-3*).

5.9.3 Control bus cable location

WARNING !

This installation must be verified by trained personnel before the initial start-up.

ENSURE THAT THE UPS INSTALLATION IS COMPLETELY POWERED DOWN.

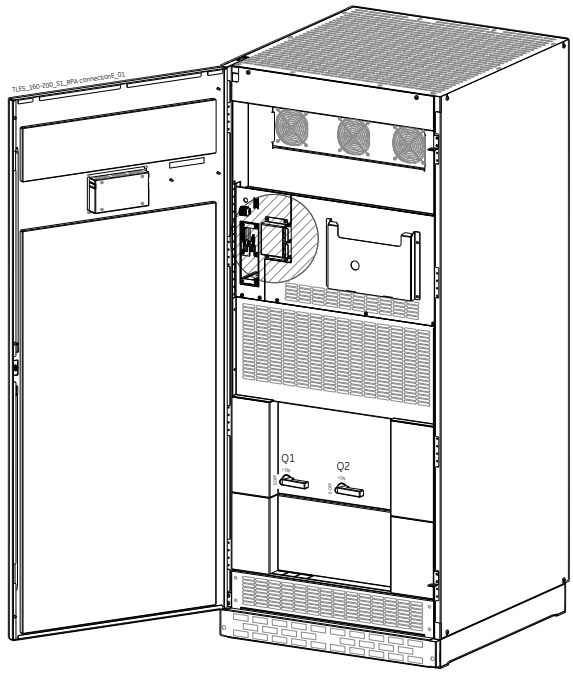


Fig. 5.9.3-1 View electronic module on intermediate unit

Access to the control bus connection

The communication bus cable connectors are placed on the two boards "***P13/P14 – IM0022 – Bus Interface Board***" (see *Fig. 5.9.3-1).*

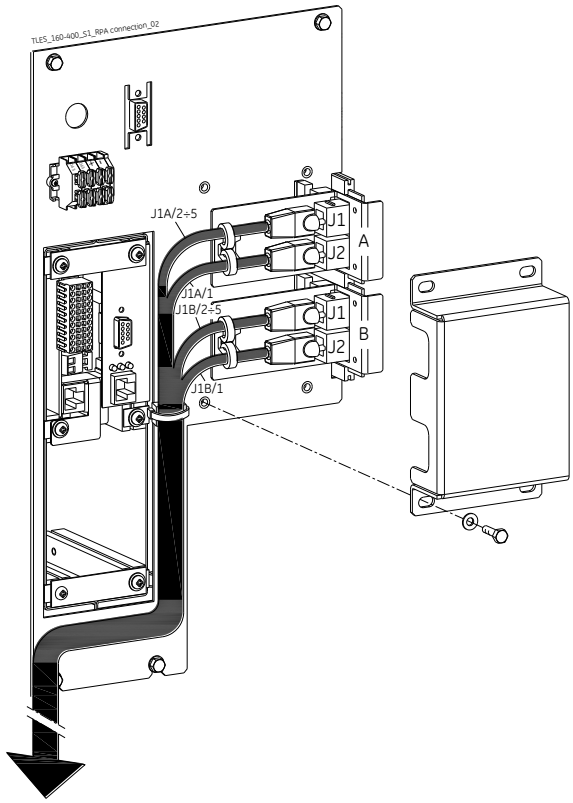


Fig. 5.9.3-2 View electronic module on intermediate unit

Control bus cables connection

- Plug the cables ***J1A – J2A*** *(1/2/3/4/5)* and ***J1B – J2B*** *(1/2/3/4/5)* on the connectors ***J1A – J2A*** and ***J1B – J2B*** placed on the two boards "***P13/P14*** – ***IM0022*** – ***Bus Interface Board***".
- Fix the communication bus cables ***J1A – J2A*** *(1/2/3/4/5)* and ***J1B – J2B*** *(1/2/3/4/5)* with the provided cable clamps "**A**".

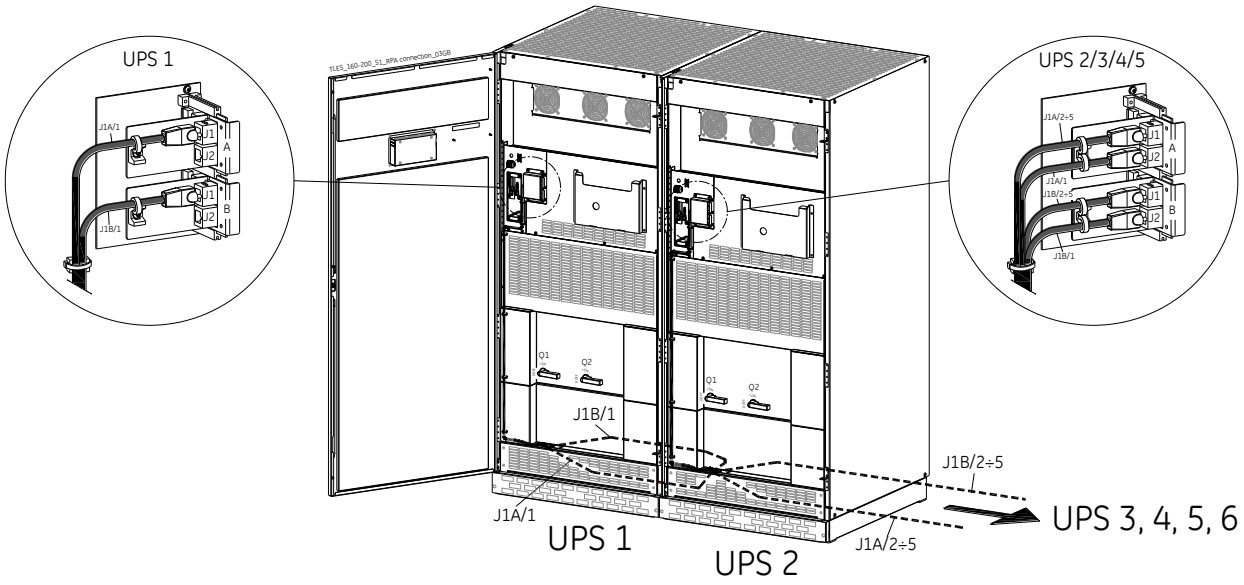


Fig. 5.9.3-3 Control Bus cable routing and connection

Control bus cables routing

Place and fix the cables ***J1A – J2A*** *(1/2/3/4/5)* and ***J1B – J2B*** *(1/2/3/4/5)* inside the UPS cabinets in the position illustrated in the drawing *Fig. 5.9.3-3*.

NOTE !

Pay attention when cabling and routing the communication bus cables *J1A – J2A (1/2/3/4/5)* and *J1B – J2B (1/2/3/4/5)* inside the UPS cabinet.

In case one unit must be removed from the *Parallel System*, the communication bus cables must be taken out the UPS cabinet WITHOUT DISCONNECTING THEM from the two boards *"P13/P14 – IM0022 – Bus Interface Board"*.

For reliability reasons the cables ***J1A – J2A (1/2/3/4/5)* and *J1B – J2B (1/2/3/4/5)*** connecting the units should be run in separated protected conduits (as indicated in *Fig. 5.9.3-4*) separated from the power cables.

It is important that the cable *J1A – J2A (1/2/3/4/5)* must be the same length as cable *J1B – J2B (1/2/3/4/5)*.

WARNING !

Connection and commissioning of an additional UPS to an existing *Parallel System* must be performed by a service engineer from of your *Service Centre*.

5.10 EPO COMMAND CONNECTION (EMERGENCY POWER OFF)

WARNING !
The connection of an emergency button EPO (Emergency Power Off) must be performed by QUALIFIED SERVICE PERSONNEL only when the UPS is COMPLETELY POWERED DOWN.

BE AWARE !
The reliability of the system depends on this contact NC (Normally Closed)!

An Emergency button (Normally Closed voltage-free contact) can be connected on terminals ***XA / EPO-1, EPO-2***. Max. rating *XA* terminals: **2.5mm²**.

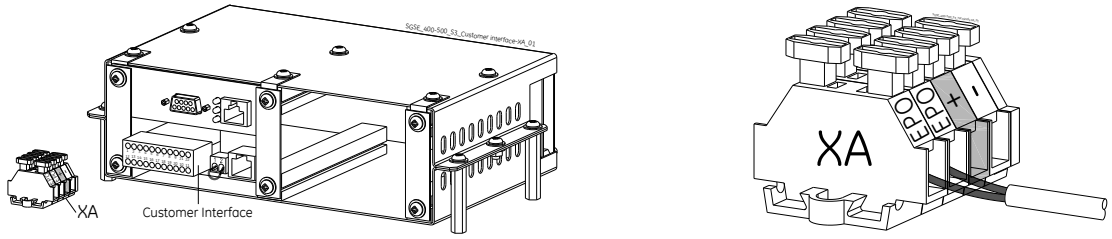


Fig. 5.10-1 XA terminal block for EPO command connection

When opened, this contact causes the immediate opening of the *Contactors K6* and *K7* as well as the shut-down of *Rectifier*, *Inverter* and *Static-Switch*.

NOTE !
This procedure could imply a *Load* shut-down.

NOTE !
To operationalize this function, in case that the UPS was provided with one or more cards *"P4 - Customer Interface"*, there must be on each card the following:
- Remove the cable short-circuiting terminals *X2 / 1, 2* (see *Fig. 5.10-2*).
- Remove the *Jumper JP2* (see *Fig. 5.10-2*).

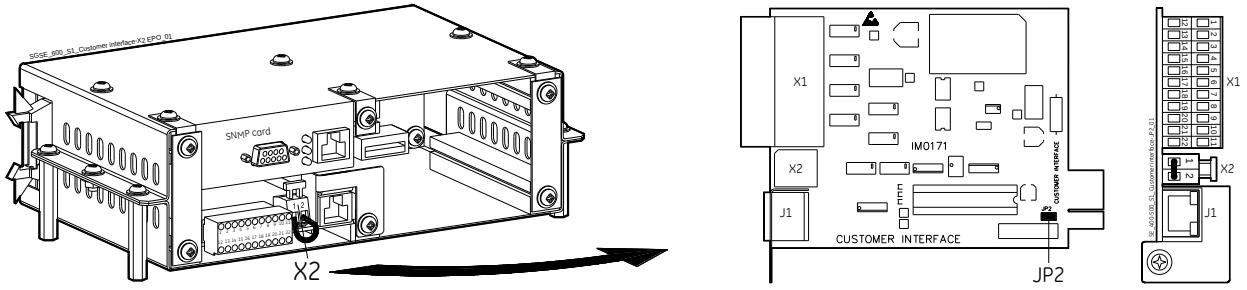


Fig. 5.10-2 X2 terminal block and Jumper JP2 on the P4 – Customer Interface Board

When the *EPO* has been activated, the system must be restored as follows:

- Realise the push-button ***EPO*** (contact on *XA / EPO-1*, *EPO-2* is closed again).
- Press the key *"**O**" (Inverter OFF* – see *Section 6.2*) on the control panel.

RPA
Redundant Parallel Architecture

In case of a Parallel System press the key "O" (Inverter OFF) on the control panel of each unit connected on the parallel bus and having its output switch Q1 closed.

6 CONTROL PANEL

6.1 CONTROL PANEL

Fig. 6.1-1 Control Panel

The *Control Panel*, positioned on the UPS front door, acts as the UPS user interface.

Main features:

- *LCD Touch screen colour graphic display. See Chapter 7.*
- *Multilanguage communication interface:*
  English, German, Italian, Spanish, French, Finnish, Polish, Portuguese, Czech, Slovakian, Chinese, Swedish, Russian and Dutch.
- *Synoptic diagram indicating UPS status.*
- *Command keys and parameters setting.*
- *UPS status control LED.*

7 LCD SCREEN

Composed of an LCD colour *"Touch Screen"* which provides the following information to users:

- *Synoptic diagram indicating UPS status.*
- UPS operating, *AC* and *DC* metering information.
- History of events (alarms and messages).
- Functionality can be programmed to meet customer needs by changing parameters.
- Operation commands of the UPS.

7.1 HOME SCREEN

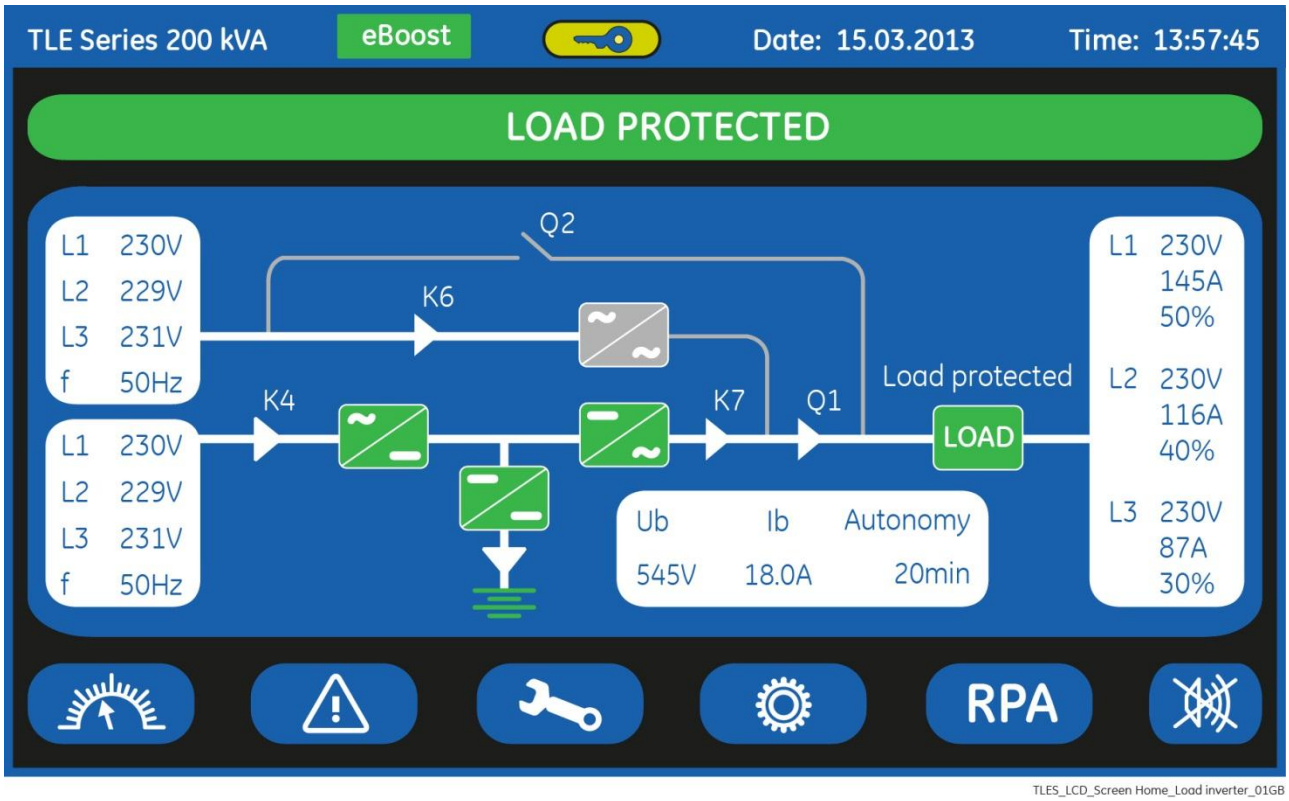


Fig. 7.1-1 LCD screen

The *LCD screen*, after 5 minutes of inactivity, shuts down the backlight.
To reactivate it, it is sufficient to press any keys mentioned to *Section 7.1.1*.

If the keypad remains inactive for 5 minutes or longer, during the viewing of a screen such as *MEASURES*, *EVENTS*, *SETUP* or *COMMANDS*, the *LCD screen* returns automatically to the main screen.

Pressing the key *"UPS status"* for a few seconds automatically sets the "ENGLISH" language on the *LCD screen*.

7.1.1 Description of the selection keys

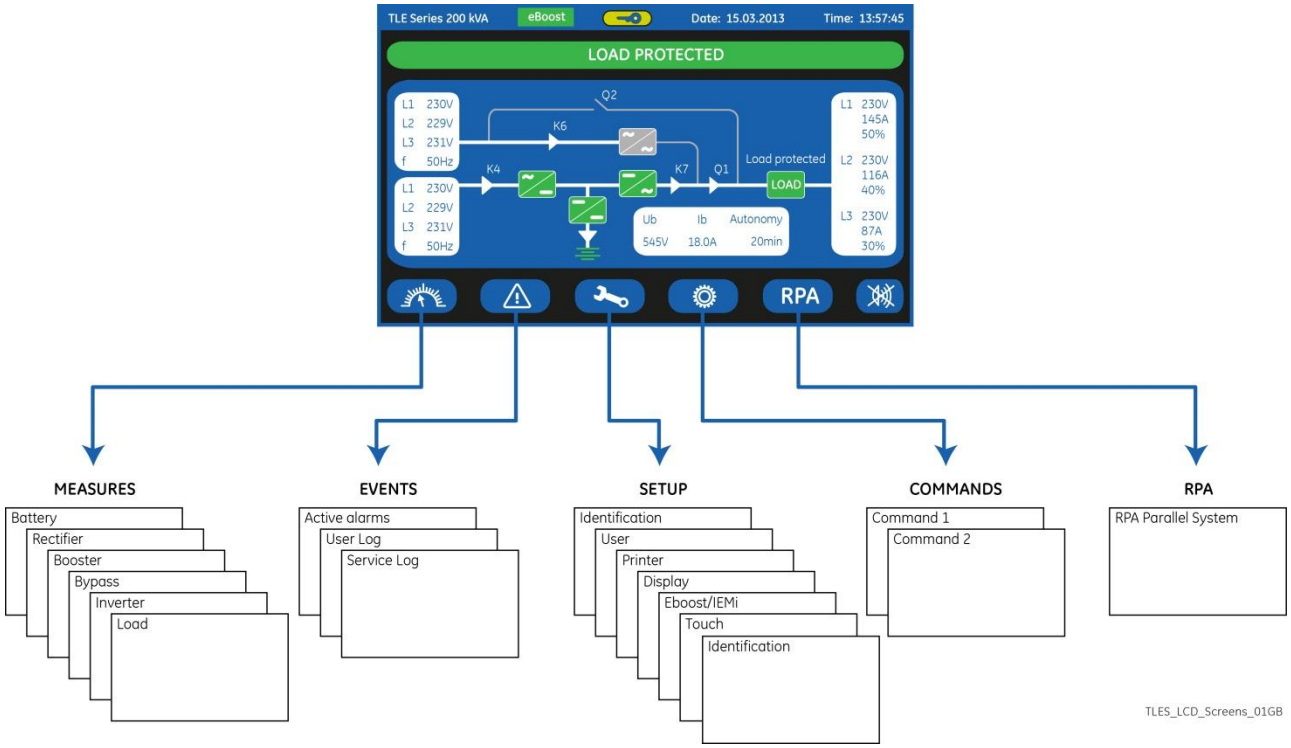


Fig. 7.1.1-1 LCD screen

MEASURES

Shows electric parameters values and statistics of use.
See *Section 7.2*.

EVENTS

Shows in chronological order, all the events occurred (alarms, messages, commands, handling, etc.).
See *Section 7.3*.

SETUP

Allows the user to customize some UPS functions to specific requirements and to view UPS identification data.
See *Section 7.4*.

COMMANDS

Allows the user to execute UPS operation commands.
See *Section 7.5*.

RPA Parallel System

Shows the status of operation of the *RPA Parallel System*.
See *Section 7.6*.

MUTE

Key to reset general alarm and buzzer.

7.1.2 Description of the signalling LEDs

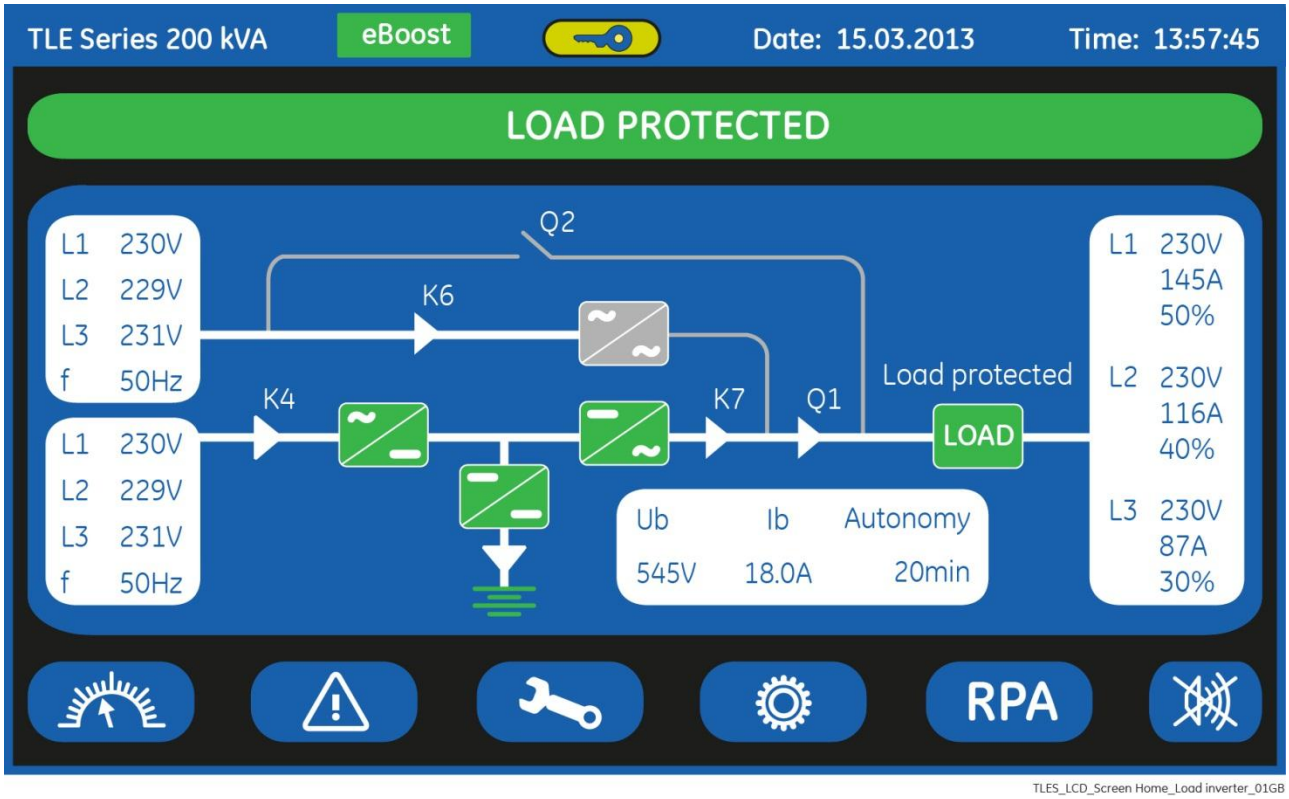


Fig. 7.1.2-1 LCD screen

TLE Series 200 kVA — UPS model

Date: 15.03.2013 — Date (format "*DD.MM.YYYY*").

Time: 13.57.45 — Time (format "*HH.MM*").

eBoost — ***eBoost (green colour)***
LED ON/lit indicates that the UPS is operating in *eBoost*™ mode.

Service Key (yellow colour)
Key for disabling the *Service Key* procedure.
Used only by the *Service Centre*

LEDS UPS STATUS

LOAD PROTECTED — ***LED LOAD PROTECTED (green colour)***

When lit, indicates that the UPS is functioning correctly and the *Load* is system protected *(Load* supplied either from *inverter* or from *Automatic Bypass* in case of *eBoost*™ *Operation Mode).*

When blinking, indicates that a regular maintenance service is needed *(SERVICE REQUIRED).*
May be reset by a *SERVICE TECHNICIAN* only.
See *Section 11 – Maintenance – Service check*.

The *LED* is *OFF* when the output switch *Q1* is open, indicating that the *Inverter* is in *service mode*, not supplying the *Load*.

ALARM

LED ALARM (yellow colour)

It blinks when one or more alarm is activated. The internal *Buzzer* is *ON*.

The *LED* remains blinking (with the alarm condition still present) and the buzzer stops when the key *"MUTE"* is pressed.

The *LED Alarm* is also lighted when the *Load* is not protected by UPS or in case *Q1 is open*.

STOP OPERATION

LED STOP OPERATION (red colour)

It warns about the imminent inverter stop (default parameter = 3 min.) and the consequent *Load* shut-down as result of:

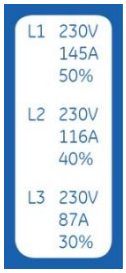
- The *battery* is fully discharged and the *Load* cannot be transferred on *Mains*.
- Overtemperature or overload condition (>125%) and the *Load* cannot be transferred on *Mains*.

Bypass

Data regarding Bypass.
See *Section 7.2*.

Rectifier

Data regarding *Rectifier*.
See *Section 7.2*.



Load output

Data regarding *Load*.
See *Section 7.2*.

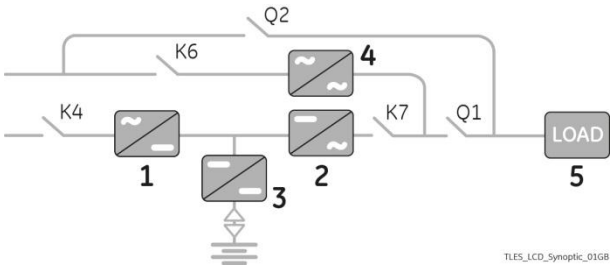
Battery

Data regarding *Battery*.
See *Section 7.2*.

Green colour: indicates battery charged.

Yellow colour: indicates STOP OPERATION status.

Red colour: indicates low battery.

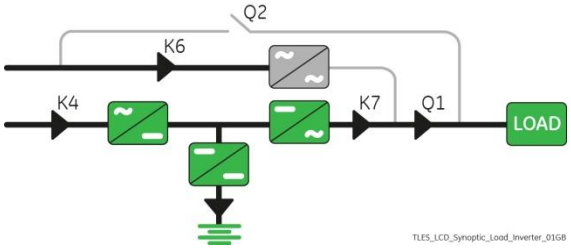


LEDs on synoptic diagram

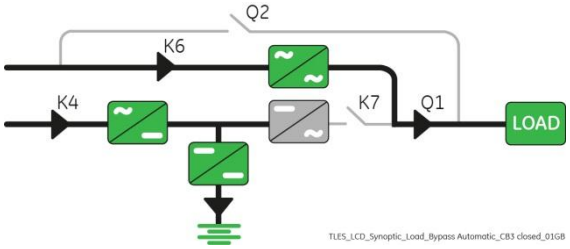
LED 1 *Rectifier*
LED 2 *Inverter*
LED 3 *Booster/Battery charger*
LED 4 *Automatic Bypass*
LED 5 *LOAD*

Examples of typical scenarios in the synoptic diagram:

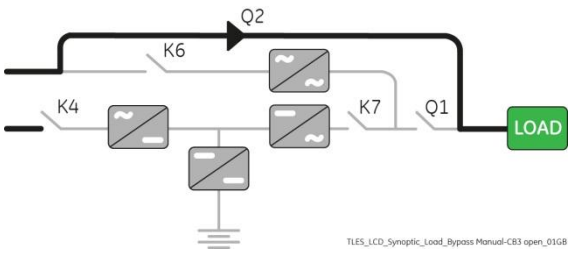
Load supplied by Inverter



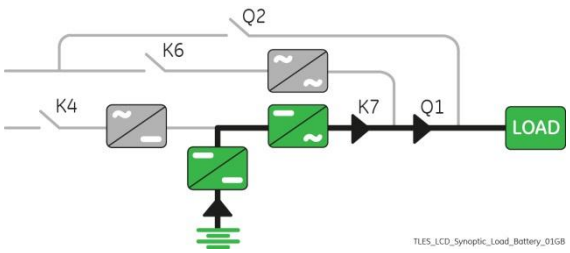
Load supplied by Automatic Bypass



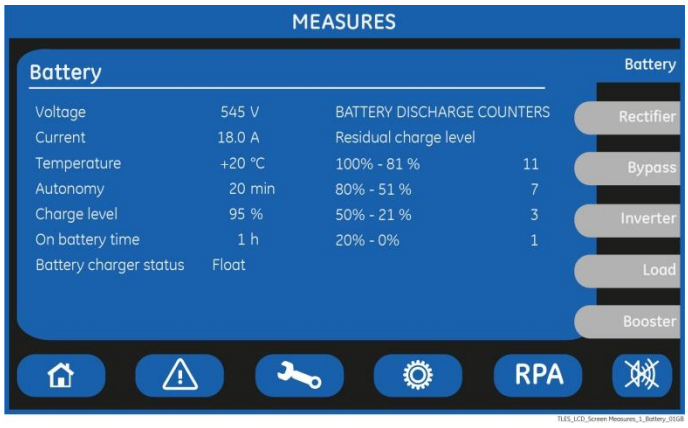
Load supplied by Manual Bypass Q2



Load supplied by Battery



7.2 MEASURES



MEASURES

The *MEASURES mode* is entered any time the "**MEASURES**" key is pressed.

The *LCD screen* will indicate a series of screenshots showing the measures of all electric parameters like AC, DC and various statistics.

In this mode the keys perform the following functions:

Return to HOME screen.

Shows the main screen *EVENTS*.
See *Section 7.3*.

Shows the main screen *SETUP*.
See *Section 7.4*.

Shows the main screen *COMMANDS*.
See *Section 7.5*.

Shows the operating status of the *RPA PARALLEL SYSTEM*.
See *Section 7.6*.

Key to reset general alarm and buzzer.

Shows the screen *Battery*.

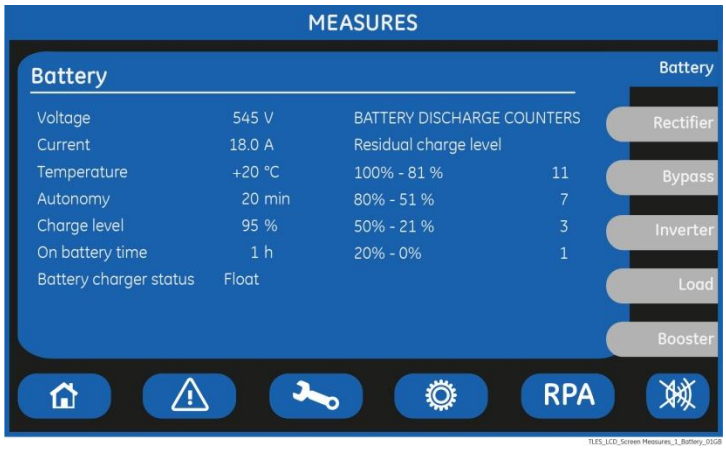
Shows the screen *Rectifier*.

Shows the screen *Bypass*.

Shows the screen *Inverter*.

Shows the screen *Load*.

Shows the screen *Booster*.



BATTERY SCREEN

Voltage
The battery voltage.

Current
The battery current (negative values correspond to the discharge of the battery).

Temperature
The temperature of the battery ("XXX" indicates sensor disabled).

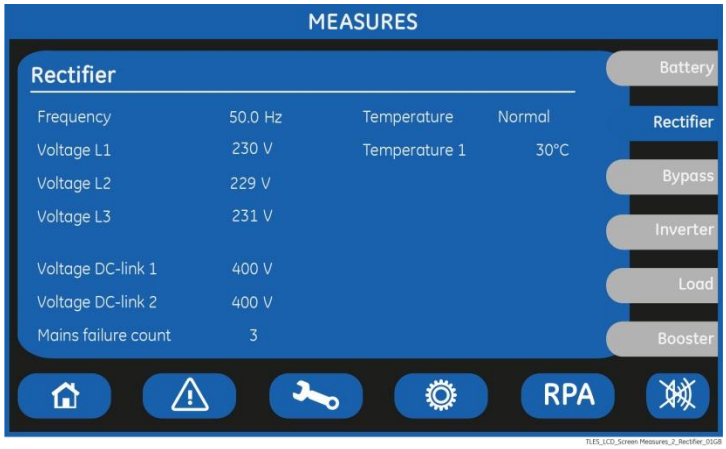
Autonomy
The estimated backup time with the present Load.

Charge level
The battery charge level.

On battery time
Total operating time of the UPS on battery (in hours).

BATTERY DISCHARGE COUNTER / Residual Charge Level
The number of discharges combined with the percentage of the available residual battery capacity at the time utility power is restored.

Battery charger status
Battery charge status (Off / Float / Boost).



RECTIFIER SCREEN

Frequency
The input frequency of the Rectifier.

Voltage L1 / Voltage L2 / Voltage L3
3-phase Mains voltage PHASE /NEUTRAL.

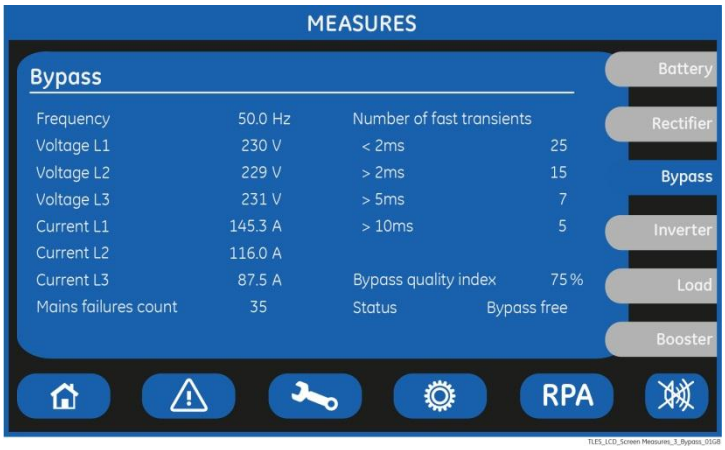
Voltage DC-link 1
DC-Link 1 voltage.

Voltage DC-link 2
DC-Link 2 voltage.

Main failure count
Total number of times a gap of mains in the Rectifier has been reordered.

Temperature
Rectifier inlet L1 Coil temperature (Normal / Alarm).

Temperature 1
Temperature of the Rectifier bridge.



BYPASS SCREEN

Frequency
The frequency of the input Mains.

Voltage L1 / Voltage L2 / Voltage L3
3-phase Mains voltage PHASE /NEUTRAL.

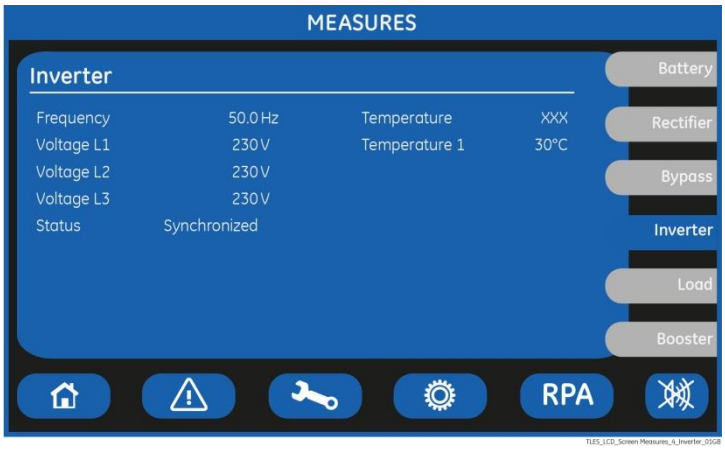
Current L1 / Current L2 / Current L3
Input Mains current for the 3-phases.

Main failure count
The total number of minor Mains faults (Bypass Mains out of tolerance faults).

Number of fast transients
The number of fast transients occurred on the bypass utility on the last seven days.

Bypass quality index
The statistic evaluation in % (100= good; 0= bad) of the Bypass mains.

Status
Bypass status: free / blocked.



INVERTER SCREEN

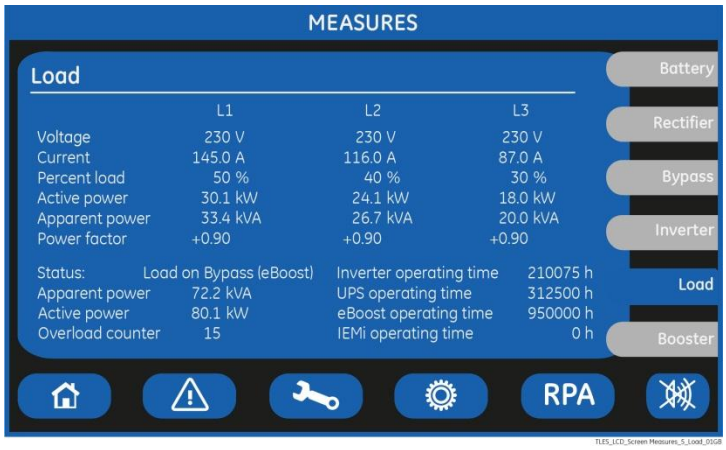
Frequency
The output frequency of the *Inverter*.

Voltage L1 / Voltage L2 / Voltage L3
3-phase output voltage PHASE/NEUTRAL.

Status
The synchronization status of the Inverter with respect to Mains:
- Synchronized.
- Not synchronized.

Temperature
"XXX" indicates disabled function.

Temperature 1
The temperature of the Inverter bridge



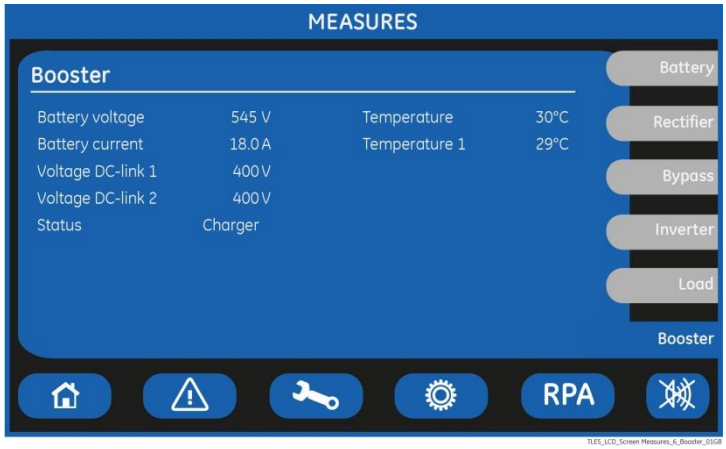
LOAD SCREEN

Voltage L1 / L2 / L3
Output voltage PHASE/NEUTRAL for each phase.

Current L1 / L2 / L3
The output current as RMS values.

Percent load L1 / L2 / L3
The output Load as percentage for each phase.

Active power	Load active power (kW) for each phase.
Apparent power	Load apparent power (kVA) for each phase.
Power factor	Load power factor: + inductive load / - capacitive load
Status	Source of the power supplied to the Load.
Inverter operating time	Total operating time for the *Inverter* (in hours).
Apparent power	Total apparent Load power (kVA).
UPS operation time	Total operating time for the UPS (in hours).
Active Power	Total effective Load power (kW).
eBoost operation time	Total operating time for the UPS in *eBoost™ Operation Mode* (in hours). This counter is displayed only when *eBoost™ Operation Mode* is available (option).
Overload counter	Total number of detected output overloads.
IEMi operation time	Total operating time for the UPS in *IEMi Operation Mode* (in hours). This counter is displayed only when *IEMi Operation Mode* is available (option).



BOOSTER SCREEN

Battery voltage
The battery voltage.

Battery current
The temperature of the battery ("SENSOR DISABLE" indicates sensor disabled).

Voltage DC-link 1
DC-link 1 voltage.

Voltage DC-link 2	DC-link 2 voltage.
Status	Booster status (Off / Booster / Charger).
Temperature	Temperature of the 4th leg's bridge
Temperature 1	Booster temperature.

7.3 EVENTS

EVENTS

The *EVENTS mode* is entered any time the "**EVENTS**" key is pressed.

The *LCD* will display a series of screens corresponding to the last 511 events (User Log).

In this mode the keys perform the following functions:

Shows the main screen *MEASURES*.
See *Section 7.2*.

Return to HOME screen.

Shows the main screen *SETUP*.
See *Section 7.4*.

Shows the main screen *COMMANDS*.
See *Section 7.5*.

Shows the operating status of the *RPA PARALLEL SYSTEM*.
See *Section 7.6*.

Key to reset general alarm and buzzer.

Shows the screen *User Events*.

Shows the screen *Service Events*. Reserved for the *Service Centre*.

Shows the previous 50 events.

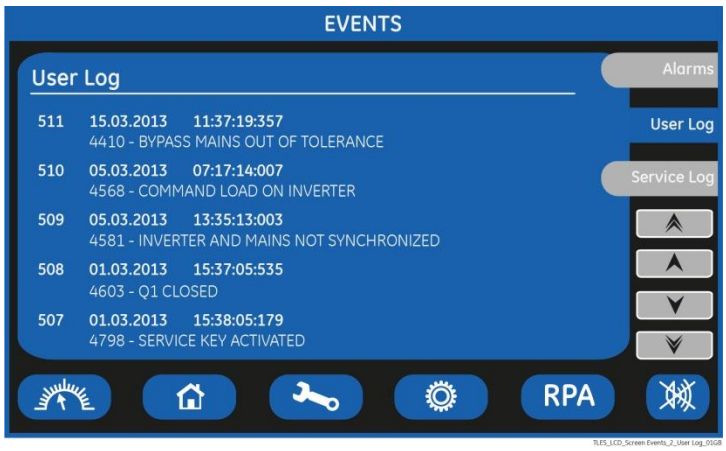
Shows the previous 5 events.

Shows the next 5 events.

Shows the next 50 events.

SCREEN ACTIVE ALARMS

Shows active events with their GE standard code and a text describing the event in the selected language



SCREEN USER LOG

User Log

Chronologically view 5 events per screenshot.
Event characteristic:

- Number chronologically assigned to an event (Nr. 511 is the more recent, Nr. 1 is the first).
- Data (DD/MM/YYYY).
- Exact hour of the moment when the event occurred (HH/MM/SS/ thousandth).
- Number of standard GE code of the event.
- Explicit text describing the event in the selected language.

SCREEN SERVICE LOG

Service Log

Chronologically view 5 events per screenshot with service related info.
Event characteristic:

- Number chronologically assigned to an event (Nr. 1022 is the more recent, Nr. 1 is the first).
- Data (DD/MM/YYYY).
- Exact hour of the moment when the event occurred (HH/MM/SS/ thousandth).
- Number of standard GE code of the event.

7.3.1 Events (alarms and messages)

Each of the following listed events, alarm or message, can be displayed on the *LCD screen*, on a *PC* with the software *"GE Data Protection"* installed or with the monitoring system *"GE iUPSGuard"*.

Alarms and *Messages* are differently specified because the ***alarms*** are indicating an abnormal functioning of the UPS (which are additionally signalled with the ***LED alarm*** and acoustically with the ***buzzer***), while the **messages** indicate the various states of operation of the UPS (stored in the events list, but not activating the *LED alarm* and the *acoustical alarm*).

7.3.2 Alarms list

Code	*Alarm*	*Description*
4000	SETUP VALUES LOST	Parameters are lost and have been replaced with default values. Please call nearest Service Centre for intervention.
4001	REGULATION BOARD FAILURE	A blocked DSP on the Control board causes this alarm, and consequently the shut-down of Rectifier and inverter and the opening of K3.
4004	UPS FAILURE ON PARALLEL SYSTEM	The master unit detected the slave unit missing on the communication bus even though switch Q1 is still closed.
4006	BUS JA CRC FAILURE	The parallel communication bus system is subject to high errors rate on channel JA.
4007	BUS JB CRC FAILURE	The parallel communication bus system is subject to high errors rate on channel JB.
4008	BUS JA FAILURE	There is an interruption in the channel JA of the parallel communication bus system.
4009	BUS JB FAILURE	There is an interruption in the channel JB of the parallel communication bus system.
4010	CONNECTIVITY BUS FAILURE	The connectivity communication bus is faulty or interrupted.
4100	RECTIFIER FUSES FAILURE	The u-switch mounted on the Rectifier input fuses indicates a blown fuse, and consequently it is shut down. Clearance of this condition allows you to restart the Rectifier.
4102	K4 CLOSING FAILURE	K4 not closed despite a closing command being issued. Signalled by auxiliary contact. Rectifier cannot start.
4103	K4 OPENING FAILURE	K4 not open despite an opening command being issued. Signalled by auxiliary contact. Mains remains connected to Rectifier bridge.
4104	BATTERY FUSES FAILURE	This function, when enabled on input programmable relays (password required), warns the user about the external Battery Fuses failure or MCB opening, signalled by NO free contact.
4105	RECTIFIER OVERTEMPERATURE	Temperature sensor indicates a situation of overtemperature on the Rectifier bridge. Only the alarm is given. The Rectifier, when in an Off state, cannot start as long as this condition persists.

Code	Alarm	Description
4106	RECTIFIER TRANSFORMER OVERTEMPERATURE	The temperature sensor inside the input transformer winding indicates overtemperature. Only the alarm is given. The Rectifier, when in an Off state, cannot start as long as this condition persists.
4110	RECTIFIER MAINS OUT OF TOLERANCE	Rectifier Input Mains is out of tolerance (voltage, frequency or phase).
4115	LOW BATTERY VOLTAGE	The Battery has been discharged and reached "stop operation" time-out (default 3 minutes), and the Inverter will be shut down. It will restart automatically only when the Battery has recharged enough for a minimum runtime.
4116	HIGH BATTERY VOLTAGE	Dangerous high DC Voltage caused inverter shut-down. Inverter restarts automatically after Battery returns to floating voltage.
4117	BATTERY EARTH FAULT	A leakage current to earth has been detected on the DC circuit.
4118	BATTERY FAULT	During battery test the voltage falls under the critical level (depending setting parameters). Battery test is stopped.
4121	HIGH DC RIPPLE	A high ripple is present in the battery voltage.
4125	HIGH DC-LINK VOLTAGE	Detection of high voltage on the DC-link. The rectifier, booster and inverter will switch off for protection purposes. The rectifier may only be switched on again if the DC-Link's voltage value falls below 430V.
4126	4th LEG CONTROL SATURATION (Imax)	The voltage in the fourth leg has reached its highest value.
4130	TURN ON RECT. OR SHUTDOWN UPS	Rectifier and Inverter are OFF. The DC power supply is discharging the Battery. Rectifier must be restarted or Battery must be disconnected in order to avoid damage.
4140	RECTIFIER CONTROL FAILURE	Rectifier Voltage hasn't reached the set value (probably fault on regulation loop). LED Rectifier on control panel is blinking.
4141	ISMAX DETECTION RECTIFIER	After 3 IS-Max condition within the time frame specified in respective parameter, the Rectifier remains shut-down.
4142	RECTIFIER CURRENT MAX	Will cause immediate shut-down of the Rectifier. Based on the value inserted in the respective parameter.
4143	BOOSTER/BATTERY CHARGER CURRENT MAX	Detection of maximum voltage in the booster/battery charger. The Booster/Battery charger and Inverter will switch off for protection purposes.

Code	Alarm	Description
4146	4TH LEG DRIVER FAILURE	The Booster's driver indicates the presence of a defect which switches the power off.
4147	BATTERY CHARGER DRIVER FAILURE	The Battery charger driver indicates a defect, switching it off.
4150	BOOSTER OVERTEMPERATURE	The temperature of the booster bridge exceeds the machine's set limit or the coil's sensor is on.
4151	4TH LEG OVERTEMPERATURE	The temperature of the 4 th leg's bridge exceeds the machine's set limit.
4165	INPUT FILTER FAILURE	The voltage of the 5th and/or 11th filters is excessive or unbalanced in its phases.
4301	INVERTER FUSES	The alarm signals an inverter outlet fuses fault, causing it to switch off immediately. It may only be manually switched on after the alarm has ceased.
4304	K7 CLOSING FAILURE	K7 not closed despite a closing command. Signalled by auxiliary contact. Load will be supplied by Mains.
4305	K7 OPENING FAILURE	K7 not open despite an opening command. Signalled by auxiliary contact. Load will be supplied by Mains.
4307	INVERTER TRANSFORMER OVERTEMPERATURE	The temperature sensor of the Inverter Transformer indicates overtemperature. Elapsed "stop operation" time, Inverter shut-down. With Mains OK, Load is transferred on Mains.
4308	DC FUSES FAILURE	Blown input DC fuse(s) F1 of the Inverter. Inverter cannot be started as long as present.
4309	DRIVER FAILURE	An abnormal condition has been detected on one or more power modules of the Inverter (temperature or overcurrent). Inverter shut-down and cannot be started as long as the alarm is present.
4310	IGBT RECTIFIER DRIVER FAILURE	Indicates a failure on the driver board or the Rectifier IGBT bridge. The Rectifier is shut-down.
4311	BOOSTER DRIVER FAILURE	Driver Booster error signal.
4312	INVERTER VOLTAGE OUT OF TOLERANCE	Inverter Output Voltage is out of the tolerances (± 10%). Inverter is switched OFF.
4320	ISMAX DETECTION	Detection of Inverter Bridge (Is) current limit causing the Inverter OFF and automatic re-start. After 3 times the Inverter switches-Off, and it can be restarted manually.
4321	HIGH CURRENT SHARING	A high exchange current value is detected between the UPS of the Parallel System.

Code	Alarm	Description
4340	INVERTER CONTROL FAILURE	The "Slave" oscillator is not in synchronized with the Master; thus causing the shut-down of its Inverter. If after a restart the condition remains, the LED inside the Inverter symbol on the panel will not light up, indicating that this Inverter cannot supply the Load anymore.
4404	K6 CLOSING FAILURE	K6 open despite a closing command being issued. Signalled by auxiliary contact. The Load cannot be supplied by Automatic Bypass.
4405	K6 OPENING FAILURE	K6 closed despite an opening command being issued. Signalled by auxiliary contact.
4406	SSM FAILURE	A faulty current has been detected in the static-switch causing the opening of the contactor K6 for 10 seconds. After 3 times K6 remains definitively open. Only a GE Service Engineer can reset the alarm.
4410	BYPASS MAINS OUT OF TOLERANCE	The Mains Bypass Voltage is out of the tolerances (± 10%). K6 opens, synchronization with Mains is inhibited and transfer to Mains is blocked.
4420	K3 CLOSING FAILURE	K3 open despite a closing command. Inverter is switched OFF. It can be restarted manually after recovery of the alarm condition.
4421	K3 OPENING FAILURE	K3 not open despite an opening command. Be aware the DC Capacitors could remain charged.
4520	NO INVERTER POWER	The Load supplied by Mains exceeds the Inverter power. The Load remains supplied by Mains until the alarm stays ON.
4522	FAN FAILURE	The Fan Control Board indicates a malfunction of one or more ventilators.
4530	LOAD LOCKED ON MAINS	Load is locked on Mains because 3 transfers on Mains have been detected in a short time (default 30 sec.). The transfer will be free after a time defined in parameter (default 30 sec.).
4531	LOAD ON MAINS BY ERROR DETECTOR	Load is transferred to Mains because the error detector detected a disturbance on the output voltage.
4563	EMERGENCY OFF ACTIVATED	Alarm after detection of an EPO (Emergency Power Off) from an external safety device connected on Customer Interface Board. Consequently K3, K4, K6, K7, K8 open, Rectifier, Inverter and SSM are switched Off.
4570	OVERLOAD	The UPS system is in an overload condition >105% on Inverter, or >150% on Mains. With Mains unavailable, a sequence of "stop operation" starts. Time out depends on degree of overload.

Code	*Alarm*	*Description*
4571	OVERLOAD: LOAD ON MAINS	With Mains Bypass supply available and Load >115%, the Load is transferred on Mains. Load will be transferred again automatically on Inverter when Load <100%.
4581	INVERTER AND MAINS NOT SYNCHRONIZED	The voltages of Mains and Inverter are not synchronized, which causes the opening of K6.
4608	ECO CONFIG FAILURE	The propagation of the eBoost / IEMi configuration to other units in a Parallel System failed.
4697	BATTERY OVERTEMPERATURE	Detection of Battery overtemperature condition. Only a GE Service Engineer can reset the alarm.
4698	BATTERY POWER INSUFFICIENT	In case of Mains Failure, with the actual Load, the run time would be below stop operation time (default 3 minutes).
4700	DC LOW	Battery voltage is at the lowest limit. Inverter will remain Off until the battery voltage reaches the value in parameter.
4701	POWER SUPPLY BOARD FAILURE	Detection of a failure on the Power Supply Board, in particular from the DC supply. Can be enabled or disabled with respective parameter.
4702	LOSS OF REDUNDANCY	A time of lost redundancy superior than specified in respective parameter was detected.
4900	LOAD LOCKED ON INVERTER	The Load is locked on Inverter after 3 Load transfers within 30 seconds. After time out (default 30 sec.) Bypass will be free.
4955	OVERTEMPERATURE	An overtemperature condition has been detected on Inverter. Elapsed "stop operation" time, Inverter shut-down. With Mains OK, Load is transferred on Mains.
4998	LOAD OFF DUE TO EXTENDED OVERLOAD	Load Off after time-out of "stop operation" for overload on Inverter (time depending on the % of overload).
4999	LOAD OFF DUE TO LOW BATT. OR TEMP.	Load Off after time-out of "stop operation" with missing Mains due to Battery low voltage or overtemperature condition.

7.3.3 Messages list

Code	*Message*	*Description*
4002	WATCHDOG RESET	The microprocessor has detected an incorrect operation: transfers the load on mains and performs a program reset. The inverter will restart automatically and will supply the load.
4003	SENSOR AUTO-CALIBRATION ERROR	The voltage reading was not correctly calibrated when the UPS was switched on.
4111	RECTIFIER MAINS OK	Rectifier Input Mains is again within the admitted tolerance (voltage, frequency and phase).
4119	BATTERY TEST STARTED	Start of Manual or Automatic Battery Test.
4120	BATTERY TEST STOPPED	End of Manual or Automatic Battery Test.
4122	MANUAL BOOST CHARGE START	Recharging has been manually activated from the control panel, bringing the final load up to the value of the respective parameter.
4123	AUTOMATIC BOOST CHARGE START	After the battery has discharged, an automatic boost charge has started to recharge the battery based on pre-defined settings.
4124	MANUAL/AUTOMATIC BOOST CHARGE STOP	The automatic boost charge has finished. The battery's voltage will return to the maintenance value. A manually activated boost charge will finish if: it is manually interrupted, the initial timer setting has expired, or the rectifier is not functioning correctly (Alarm 4140). The battery voltage will return to the maintenance value.
4144	BOOSTER ON	It transfers energy from the battery to the DC-link.
4145	BOOSTER OFF	The booster is switched off.
4148	BATTERY CHARGER ON	The battery charger is switched on and is charging the battery.
4149	BATTERY CHARGER OFF	The battery charger is switched off.
4161	RECTIFIER ON	Rectifier started.
4162	RECTIFIER OFF	Rectifier shut-down.
4163	GENERATOR ON	Customer Interface (X1 - 11, 22) received a Gen-set ON signal. Operating mode depend on setting of Parameters.
4164	GENERATOR OFF	Customer Interface (X1 - 11, 22) received a Gen-set OFF signal. Function Bypass enabled depends on setting of Parameter.
4302	INVERTER CANNOT BE TURNED ON	Inverter cannot be switched on because one of the following conditions is still present: - Overtemperature - K7 opening Failure - Low Battery Voltage - High Battery Voltage - Inverter Fuses - DC Low - Overload - EPO (Emergency Power Off)

Code	Message	Description
4303	INVERTER CANNOT BE TURNED OFF	Inverter cannot be switched OFF, because the Load cannot be switched to Mains (voltage out of tolerance, not synchronized, BP blocked).
4361	INVERTER ON	The command to start the Inverter has been activated on the control panel.
4362	INVERTER OFF	The command to switch OFF the Inverter has been activated by the control panel or automatically for alarm presence.
4411	BYPASS MAINS OK	Bypass Input Mains is again within tolerance (voltage, frequency and phase).
4500	COMMAND LOAD OFF	Disconnection of the Load by opening K6 and K7 for: EPO / Load Off / Overload / Stop Operation.
4521	NO BYPASS POWER	With the Load supplied by Automatic Bypass, a Mains Failure or K6 opening occurred.
4534	MULTIPLE LOAD TRANSFER	2 transfers Inverter- Mains have been detected in a short time (default 30 sec.).
4535	BYPASS LOCKED	Bypass is not available. Contactor K6 is open, SSM deactivated.
4536	BYPASS FREE	Bypass is enabled. Contactor K6 is closed.
4561	LOAD OFF	Push-button "Load Off" on the UPS Control Panel has been pressed, with the output circuit switch Q1 closed.
4562	DETOUR ON	The auxiliary contact indicates that Manual Bypass Q2 was closed.
4564	DETOUR OFF	The auxiliary contact indicates that Manual Bypass Q2 was opened.
4567	COMMAND LOAD ON MAINS	The control unit received a command to transfer the Load on Mains.
4568	COMMAND LOAD ON INVERTER	The control unit received a command to transfer the Load on Inverter.
4572	NO MORE OVERLOAD	End of the overload condition detected with alarm 4570.
4580	INVERTER AND MAINS SYNCHRONIZED	The voltages of Inverter and Mains Bypass are synchronized.
4582	COMMAND NOT TO SYNCHRONIZE	Command not to synchronize with Mains.
4583	COMMAND TO SYNCHRONIZE	Command to synchronize with Mains.
4600	COMMAND UPS ON	The eBoost operation mode function has been disabled or the programmed time is expired. The UPS returns to VFI mode supplying the Load normally by inverter.
4601	COMMAND UPS STAND BY	The function eBoost operation mode is enabled, and according to the time program the UPS will run in eBoost mode, supplying the Load normally by mains.
4602	Q1 OPEN	The auxiliary contact indicates that the output switch Q1 was opened.
4603	Q1 CLOSED	The auxiliary contact indicates that the output switch Q1 was closed.

Code	*Message*	*Description*
4605	COMMAND IEMi OFF	The IEMi Operation Mode has been disabled or the programmed time is expired.
4606	eBoost/IEMi ACTIVATION ALLOWED	eBoost/IEMi control signal has been cleared on the Customer Interface Board (X1 - 11, 22). Operating mode depends on scheduled activation of the functions.
4607	eBoost/IEMi ACTIVATION INHIBITED	Customer Interface Board (X1 - 11, 22) received an eBoost/IEMi control signal. eBoost™ Operation Mode and IEMi Operation Mode will be temporarily inhibited.
4609	eBoost INHIBITED - LOW LOAD	eBoost™ Operation Mode inhibited due to minimal load not reached.
4699	BATTERY TEST IMPOSSIBLE	Automatic Battery Test is not possible due to: - No Mains Rectifier or Bypass. - Battery not fully charged. - Load is below 10% or above 80%. Test is postponed for 1 week.
4763	REMOTE CONTROL ON	Inverter can be started or shut-down by remote control. Commands source can be chosen depending on the value of parameter (Service only): 0 = Only local panel 1 = Only Remote Control 2 = Both
4764	REMOTE CONTROL OFF	Inverter cannot be started or shut-down by remote control. Commands source can be chosen depending on the value of parameter (Service only): 0 = Only local panel 1 = Only Remote Control 2 = Both
4798	SERVICE KEY ACTIVATED	A valid Service Key has been entered. It will no longer be requested in the next 6 hours.
4799	SERVICE KEY DEACTIVATED	The Service Key validity period has expired.

7.4 SETUP

SETUP

The *SETUP mode* is entered any time the "**SETUP**" key is pressed.

This screen allows the user to modify some parameters permitting to adapt some functions of the UPS to his/her needs, described as follows.

The *LCD* will display a series of screens containing the user parameters, accessible without password protection.

In this mode the keys perform the following functions:

Shows the main screen *MEASURES*.
See *Section 7.2*.

Shows the main screen *EVENTS*.
See *Section 7.3*.

Return to HOME screen.

Shows the main screen *COMMANDS*.
See *Section 7.5*.

Shows the operating status of the *RPA PARALLEL SYSTEM*.
See *Section 7.6*.

Key to reset general alarm and buzzer.

Shows the screen *User*.

Shows the screen *Service Basic*.
Reserved for the *Service Centre*, at this level the parameters access is protected by a code.

Shows the screen *Service Full*.
Reserved for the *Service Centre*, at this level the parameters access is protected by a code.

PRINTER SCREEN

The UPS is capable of communicating to a serial printer, to printout disparate information.
Please be sure to have a serial printer with a serial *RS232* interface.
This is the only printer-interface supported by the UPS.

Baudrate
This parameter controls the baud rate used for data transmission.

Parity This parameter controls the parity used for data transmission.
odd / even / None can be selected.
In case *"None"* has been set, automatically the parameter *"Data bits = 8"* is used, independently of the value of *"Data Bits"* set.

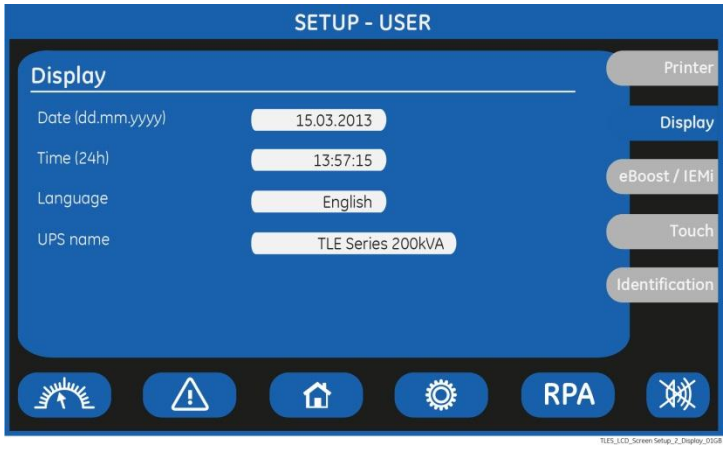
Data bits This parameter controls the length of the data word on the serial line during data transmission.

Stop bit Parameter non programmable.

Handshake This parameter is used to determine the communication protocol used when printing.
Valid values are *"XON"* standing for the *XON/XOFF* protocol or *"None"* standing for any protocol

PRINTER COMMANDS The selected data may be printed using the *MEASURES / EVENTS / PARAMETERS / ALL* keys.

	NOTE ! **Please configure your printer with the following parameters:** ***2400/None/8/2/None* (2400 bauds/sec, no parity, 8 bits, no Handshake).**



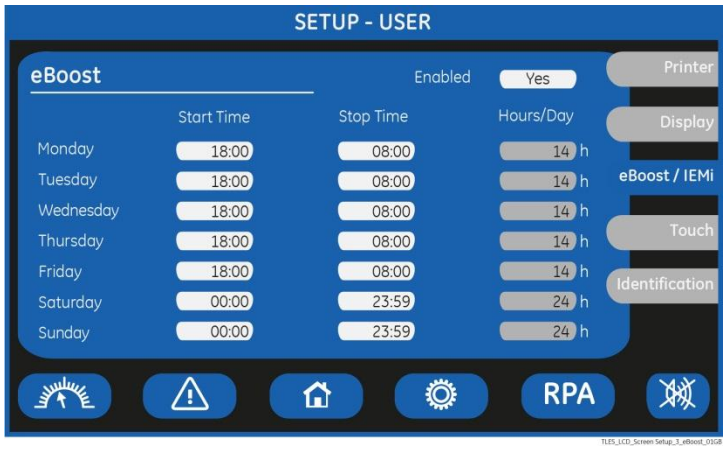
DISPLAY SCREEN

Date
You can adjust the date of the real time clock existing in the UPS by the means of this parameter.
The value you enter is thoroughly checked to be a correct date in the format *"DD.MM.YYYY"*.

Time
You can adjust the time of the real time clock existing in the UPS by means of this parameter.
The value you enter is thoroughly checked to be a correct time in the format *"HH.MM.SS"*.
The time is specified in 24-hour format.

Language This parameter allows the choice of language used to display the information.
Valid choices are: *English, German, Italian, Spanish, French, Finnish, Polish, Portuguese, Czech, Slovakian, Chinese, Swedish, Russian and Dutch.*

UPS name The user can choose the name of the UPS model shown on the main screen (max. 20 characters).



eBOOST SCREEN (option)

This screen is displayed only when *eBoost™ Operation Mode* is available (option).

Enabled
This parameter (values *Yes/No)* enables or disables the *eBoost™ Operation Mode*.
If the value is *"Yes"* and the current time is in the interval for the current day, the *eBoost™ Operation Mode* is active.

RPA
Redundant Parallel Architecture

In case of RPA Parallel System

If *eBoost™ Operation Mode* is currently disabled *(No)* and *Q1* is closed, when programming it to enable *(Yes)* the selected configuration will automatically be propagated to all units in the *RPA Parallel System*.

The activation / deactivation of *eBoost™ Operation Mode* is indicated each time in the event list.

In order to check the *inverter* function, at least *1 minute* of *VFI* mode must be programmed during the week (the *Yes/No* parameter is automatically disabled if this condition is not satisfied).

In case this minimum time in *VFI mode* is not respected, the *eBoost™ Operation Mode* will be disabled.

If the value is *"No"*, the UPS is normally operating in *VFI / double conversion mode* at all times.

When the UPS is in *eBoost™ Operating Mode* the *eBoost LED* is ON (green light)

NOTE !

The configuration of the activation schedule can only be updated when *eBoost™ Operation Mode* is disabled (Enabled: No).

DAY
For the weekdays from *"Monday* to *Sunday,* the edit mode (edit day) allows to define time intervals when the UPS is operating in *eBoost™ Operation Mode*. The hour is given in 24-hour format.
These intervals are defined by:

Start Time: The hour of the day after which the *eBoost™ Operation Mode* is enabled.
The *eBoost™ Operation Mode* is enabled until the following *"Stop Time"* time is reached (the *"Stop Time"* time of the same day if this is later than the *"Start Time"* time, the *"Stop Time"* time of the following day otherwise).

Stop Time: The hour of the day before which the *eBoost™ Operation Mode* is enabled

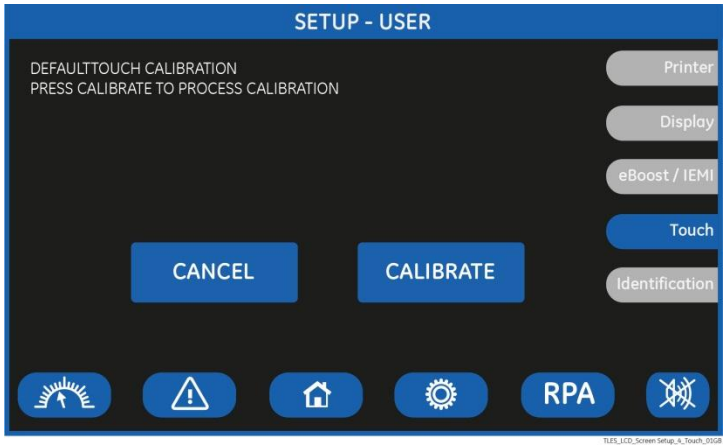
The *eBoost™ Operation Mode* is enabled starting from the preceding *"Start Time"* time (the *"Start Time"* time of the same day if this is earlier than the *"Stop Time"* time, the *"Start Time"* time of the previous day otherwise)..

Identical times for *eBoost START* and *"Stop Time"* maintain the existing mode only in case the previous command was *eBoost START* and the following command will be *"Stop Time"*.

HOURS/DAY
The number of *eBoost™ Operation Mode* hours per weekday *"Monday* to *Sunday"* is displayed in the operation mode parameter window (ceiling value).

	NOTE ! **To avoid undesired *eBoost™ Operation Mode*, verify:** • **Date and Time.** • ***eBoost™* screen how many hours of *eBoost™ Operation Mode* have been selected for each day of the week.**

	NOTE ! **The *eBoost™ Operation Mode* will become active only if the *Load* is supplied from the *Inverter*.** ***eBoost™ Operation Mode* is only possible if the UPS load exceeds a minimum threshold (default 10% of the rated capacity).** **In case no-load conditions, or anyway below said threshold, the UPS operates in *VFI mode*.**



TOUCH SCREEN

This screen permits the adjustment (*"CALIBRATE" key)* of the LCD's *"Touch Screen"* sensitivity.

IDENTIFICATION SCREEN

ID
Number of UPS in the RPA Parallel System (0 for single unit).

Model
UPS model, power range and series number.

S/N
The UPS serial number.

UPS SW version
The UPS software version.

Display SW version
The LCD display software version.

7.5 COMMANDS

COMMANDS

The *COMMANDS mode* is entered any time the "**COMMANDS**" key is pressed.

Allows the user to execute UPS operation commands.

In this mode the keys perform the following functions:

Shows the main screen *MEASURES*.
See *Section 7.2*.

Shows the main screen *EVENTS*.
See *Section 7.3*.

Shows the main screen *SETUP*.
See *Section 7.4*.

Return to HOME screen.

Shows the operating status of the *RPA PARALLEL SYSTEM*.
See *Section 7.6*.

Key to reset general alarm and buzzer.

Shows the screen *Commands 2*.

Shows the screen *Commands 1*.

COMMANDS 1 SCREEN

Allows the user to execute UPS operation commands.

Rectifier

Rectifier ON

Rectifier switching ON command.

Rectifier RESET

Rectifier restore command.
Reserved for the *Service Centre*.

Led Rectifier status

Indicates the Rectifier's status: ON = lit OFF = turned Off

Inverter

Inverter ON

Inverter switching ON command.

	NOTE ! **When *eBoost™ Operation Mode* is enabled, control of Inverter status and selection of the feed path is done autonomously by the UPS control logic. Therefore, *Inverter ON / Inverter OFF* commands are disabled when *eBoost™ Operation Mode* is enabled.**

Inverter OFF

Inverter switching OFF command.

This key is also used as *EPO (Emergency Power Off)* reset after the contact closing.

	NOTE ! ***Inverter OFF* command is disabled when *eBoost™ Operation Mode* is enabled.**

Led inverter status

It indicates the rectifier status:
ON / OFF / Pre-charge / Pre-charge completed / Soft-start

Module shutdown

Module shutdown
Load Off command for a single UPS.

	NOTE ! **This command will immediately disconnect the *Load*.** **"*Module shutdown*" cannot disconnect the UPS from the *Load* with *Q2* closed.**
RPA Redundant Parallel Architecture	***For the RPA Parallel System*** *In an RPA Parallel System, the "Module shutdown" command disconnects the Load to the selected unit only (with the outgoing load switch Q1 closed).*

Module shutdown RESET
Shutdown module restore command for an individual UPS

Led Module shutdown status
Shows the *Module shutdown* status: ACTIVE / NOT ACTIVE

System shutdown

System shutdown
Load Off command for an RPA Parallel System.

	NOTE ! **This command will immediately drop the *Load*.** **"*System shutdown*" cannot disconnect the *RPA Parallel System* from the *Load* with *Q2* closed.**
RPA Redundant Parallel Architecture	***For the RPA Parallel System*** *If the "System shutdown" command is performed on one unit connected to the parallel bus (switch Q1 closed), all the units are separated from the Load.*

System shutdown RESET
System shutdown restore command for a RPA Parallel System.

RPA Redundant Parallel Architecture	***For the RPA Parallel System*** *The "System shutdown reset" must be done only on one unit connected to the parallel bus (switch Q1 closed).*

Led System shutdown status
Shows the *System shutdown* status: ACTIVE / NOT ACTIVE

Booster

Only for *Service Centre*.

COMMANDS 2 SCREEN

Allows the user to execute UPS operation commands.

Buzzer TEST

Acoustical alarm test (acoustical alarm should be always activated).

Module shutdown procedure

Function not enabled.

Module start-up procedure

Function not enabled.

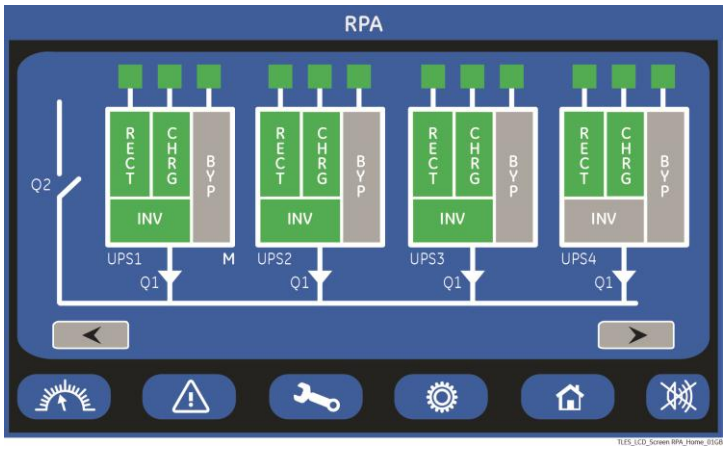
System on bypass

Function not enabled.

Battery Charger

Function not enabled.

7.6 RPA PARALLEL SYSTEM



RPA
PARALLEL SYSTEM
(option)

The *RPA PARALLEL SYSTEM* is entered any time the "**RPA**" key is pressed.

This screen is only displayed when the *RPA Parallel System* is available (option).

The *LCD screen* will provide some information on the Parallel System

In this mode the keys perform the following functions:

Shows the main screen *MEASURES*.
See *Section* 7.2.

Shows the main screen *EVENTS*.
See *Section 7.3*.

Shows the main screen *SETUP*.
See *Section* 7.4.

Shows the main screen *COMMANDS*.
See *Section* 7.5.

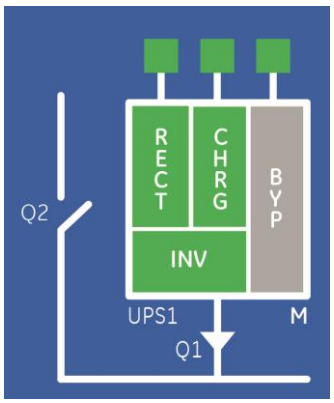
Return to HOME screen.

Key to reset general alarm and buzzer.

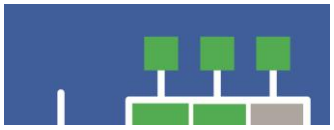
Shows the screen for the next *RPA Parallel System* units

Shows the screen of the previous *RPA Parallel System* units.

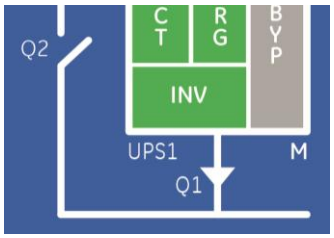
Description of the *RPA Parallel System* screen's main elements



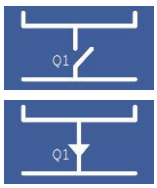
RECT	Rectifier green colour = On / grey colour = Off
CHRG / BST	Battery Charger / Booster green colour = On / grey colour = Off
INV	Inverter green colour = On / grey colour = Off
BYP	Automatic Bypass green colour = On / grey colour = Off
UPS1÷6	Number of UPS in the *RPA Parallel System*
M	Master unit of the *RPA System Parallel*



Input Mains status (for RECT – Rectifier and BYP - Bypass)
Battery status (for CHRG – Battery Charger)
green colour = On / grey colour = Off



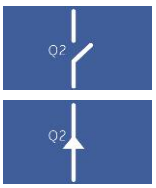
Q1 Load output switch



Open

Closed

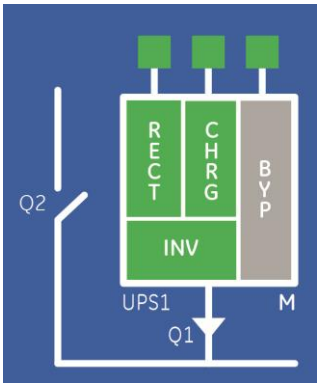
Q2 Manual Bypass switch



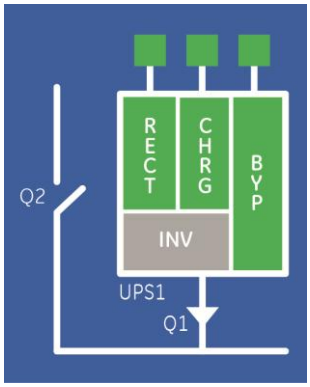
Open

Closed

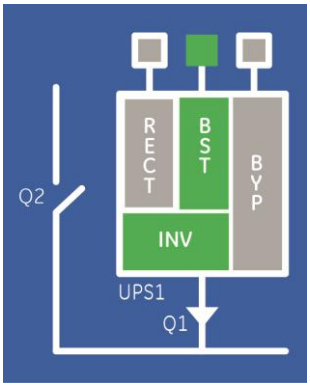
Examples of the main *RPA Parallel System* unit status situations



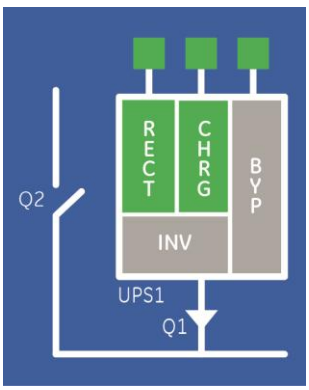
UPS with Load supplied by Inverter



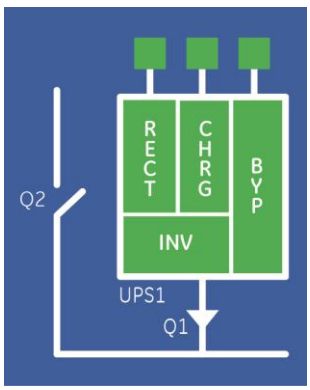
UPS with Load supplied by Automatic Bypass



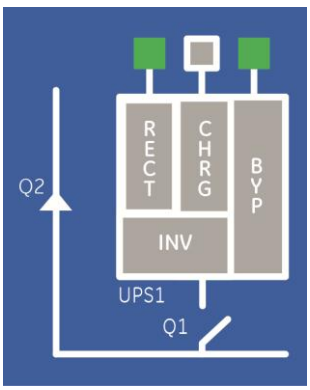
UPS with Load supplied by Battery



UPS in stand-by in an Redundant RPA Parallel System



UPS in eBoost Operating Mode

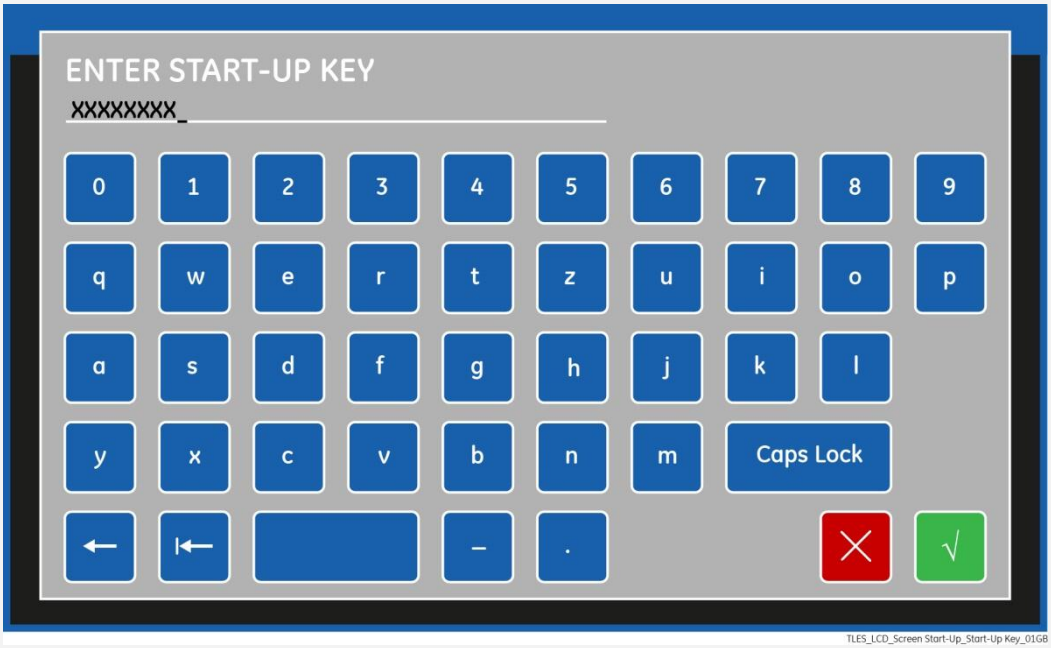


UPS with Load supplied by Manual Bypass

8 OPERATION

NOTE !

TLE Series 160 & 200 **requires the introduction of a "START-UP KEY" code to perform the first commissioning.**


ENTER START-UP KEY
XXXXXXXX_
0 1 2 3 4 5 6 7 8 9
q w e r t z u i o p
a s d f g h j k l
y x c v b n m Caps Lock
– .
√
TLES_LCD_Screen Start-Up_Start-Up Key_01GB

ESC taste **ENTER taste**

The *"START-UP KEY"* code can be introduced by a *SERVICE TECHNICIAN GE* only.

The introduction of the *"START-UP KEY"* code is mandatory to proceed to the first start-up of the UPS.

WARNING !

Verify that the input/output connections have been performed by qualified personnel before connecting Mains input voltage and verify that the equipment is correctly grounded.

Open only the front door, do not remove any panels.

Now you can initiate the start-up procedure of the UPS system.
There is no need for specific knowledge if you follow carefully the step-by-step instructions given below.
However we recommend that at least the initial procedure should be performed by an instructed person.

Check after every step for correct reaction of the UPS (LEDs on the panel), and correct voltage and current measurements, before you proceed to the next step.

If you encounter any problems during the following procedures, you should not continue, but contact *GE Global Services*.

NOTE !

All operations (including start-up, shut-down, removing/adding a unit from/to a *Parallel System*) MUST BE PERFORMED with *eBoost™ Operation Mode* DISABLED.

Find on the following pages the descriptions of the various procedures of start-up and shut-down for single and parallel UPSs, divided into the following principal chapters:

8.1 PROCEDURES FOR SINGLE *TLE Series 160 & 200*

8.2 PROCEDURES FOR SINGLE *TLE Series 160 & 200* FUNCTIONING AS FREQUENCY CONVERTER

8.3 PROCEDURES FOR *TLE Series 160 & 200* PARALLEL SYSTEM

RPA
Redundant Parallel Architecture

This symbol refers to the operations of a RPA Parallel System.

8.1 PROCEDURES FOR SINGLE TLE SERIES 160 & 200

8.1.1 Initial start-up of the TLE Series 160 & 200

WARNING !

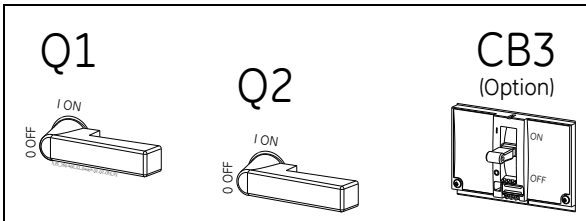
Before proceeding to turn on the UPS system, ensure that the *AC* and *DC external isolators* are OFF, and prevent their inadverted operation.

Ensure that the *Output Load distribution* can be powered and all the *Output Isolators* are open.

This procedure must be performed for the first start-up following the installation, with the UPS completely switched Off and not powered.

Open the front door and make sure that:

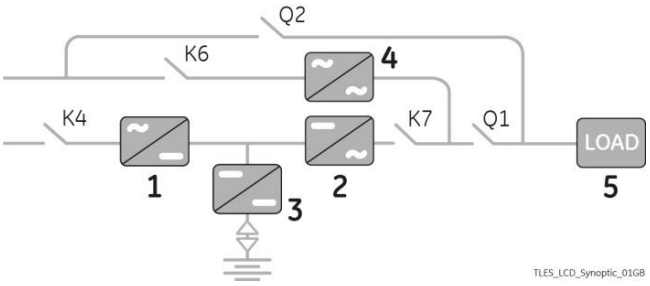
- All the ***connections*** to the input/output terminals or bus bars of the UPS have been made correctly.
- The ***safety screens*** are fixed in their position.
- The switches ***Q1***, ***Q2*** and ***CB3 (option)*** **are open** (Pos. O) and the external ***Battery protections*** **must be open** (Pos. O).



Q1 *Load output switch*

Q2 *Manual Bypass switch*

CB3 *External battery switch (option)*



LEDs on synoptic diagram

LED 1 *Rectifier*
LED 2 *Inverter*
LED 3 *Booster/ Battery charger*
LED 4 *Automatic Bypass*
LED 5 *LOAD on UPS*

LED ALARM — ALARM

LED LOAD PROTECTED — LOAD PROTECTED

Command Inverter ON — Inverter ON

Command Inverter OFF — Inverter OFF

Command System Shutdown — System shutdown SHUTDOWN

Command System Shutdown Reset — System shutdown RESET

1. ***Switch-ON the Mains voltage from the input distribution (both Rectifier and Bypass if separated).***

   The UPS performs a *"Self-test"*.
   A successful termination of the tests will be indicated with Overall test results *"OK"*.
   Commissioning cannot be continued should one or more tests result to be negative. Please contact in this case your *Service Centre*.

   At this stage the *Electronic Power Supply* and *Control Panel* are switched ON and the *Buzzer* sounds.

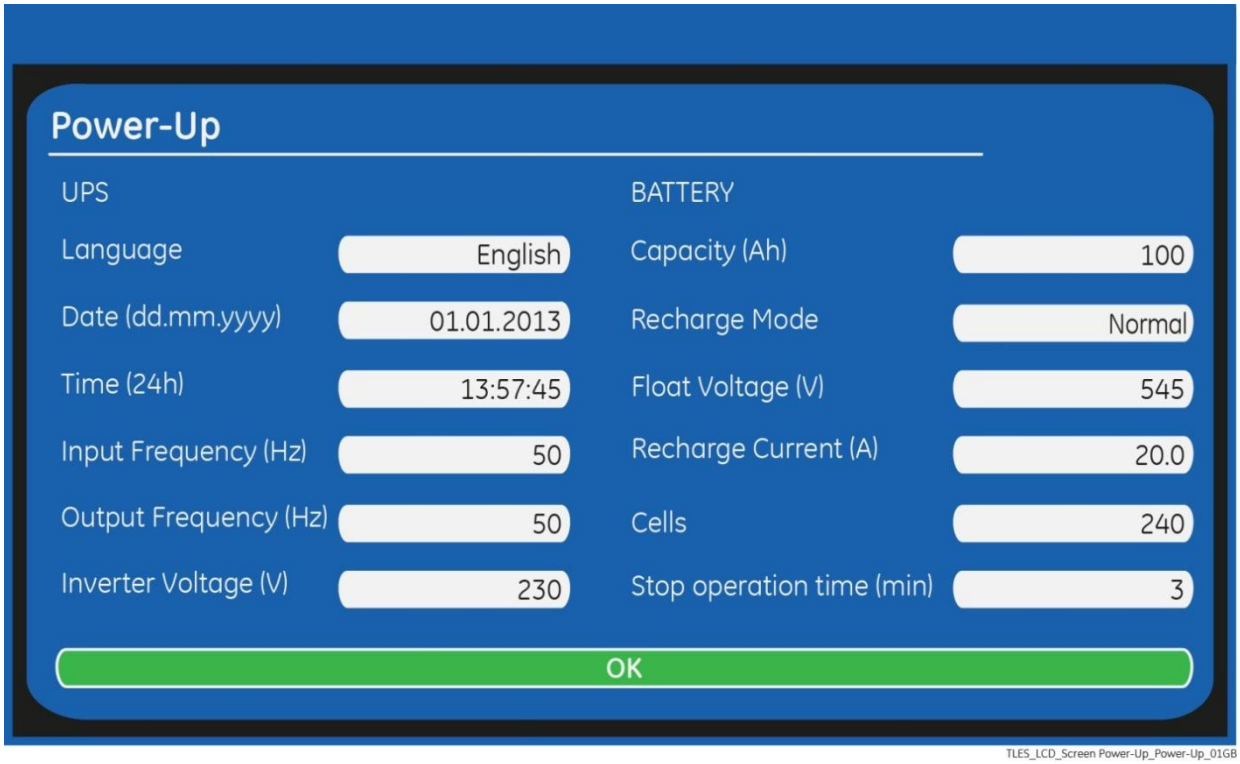
   Press *"MUTE"* key to reset *Acoustical Alarm*.
   LED Alarm remains lit.

Continue ►

During the first commissioning *TLE Series 160 - 400* requests a set-up of the UPS configuration parameters presented in the following "Power-Up" screen.

Without such configuration it is not possible to continue with the commissioning procedure.

	WARNING ! **The set-up of the UPS configuration parameters must be done only by QUALIFIED AND TRAINED PERSONNEL.** **The set-up of mistaken values could compromise the integrity and reliability of the UPS.**



UPS

Language — This parameter allows the choice of language used to display the information.

Date (dd.mm.yyyy) — You can adjust the date of the real time clock existing in the UPS by the means of this parameter.
The value you enter is thoroughly checked to be a correct date in the format *"DD.MM.YY"*.

Time (24h) — You can adjust the time of the real time clock existing in the UPS by means of this parameter.
The value you enter is thoroughly checked to be a correct time in the format *"HH.MM.SS"*.
The time is specified in 24-hour format.

Input Frequency (Hz) — Input frequency value (50 Hz / 60Hz).

Output Frequency (Hz) — Inverter output frequency value (50 Hz / 60Hz)..

Inverter Voltage (V) — Output voltage PHASE/NEUTRAL of the inverter (220V / 230V / 240V).

Continue ▶

BATTERY

Capacity (Ah)	Ah capacity of the Battery.
Recharge Mode	Recharge type of the battery - Normal: Sealed Battery (VRLA), NiCd without boost-charge and Open Battery without boost-charge. - NiCd: Nickel Cadmium Battery with boost-charge. - Wet Lead Acid Boost: Open Battery with boost-charge.
Float Voltage (V)	Voltage to maintain battery charging. Float voltage = Number of battery cells x battery float voltage per cell. Typical battery float voltage per cell (ask the battery manufacturer for confirmation): *Sealed Battery (VRLA)*: 2.27Vdc for cell 177÷192 cells x 2.27Vdc = **402 ÷ 436Vdc** *NiCd Battery without boost-charge*: 1.41Vdc for cell 284÷309 cells x 1.41Vdc = **401 ÷ 436Vdc** *NiCd Battery with boost-charge*: 1.41 (1.55 boost-charge) Vdc for cell 281 cells x 1.41Vdc = **397** (436) **Vdc** *Open Battery without boost-charge*: 2.23Vdc for cell 180÷195 cells x 2.23Vdc = **402 ÷ 435Vdc** *Open Battery with boost-charge*: 2.23 (2.35 boost-charge) Vdc for cell 180÷185 cells x 2.23Vdc = **402** (423) ÷ **413** (435) **Vdc**
Recharge Current (A)	Maximum battery recharge current. Max 20% of battery capacity (Ah). Example: 100Ah - max recharging current 20A.
Cells	Number of cells of the Battery, see "**Float voltage**". Example: 240 battery cells - 40 blocks / 12Vdc Battery - 80 blocks / 6Vdc Battery - 240 blocks / 2Vdc Battery
Stop Operation Time (min)	Residual battery autonomy time before UPS forced shut-down. Standard set 3 minutes. Standard set 3 minutes. Settable from 1 minute to autonomy time in minutes.

NOTE !

I dati indicati sono da considerarsi valori di riferimento standard.

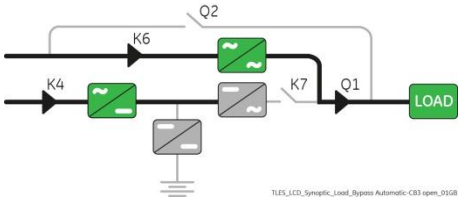
Gli effettivi valori da impostare sono quelli rilasciati dal fornitore della batteria.

Continue ▶

2. *Close UPS output switch Q1 (Pos. I).*

- The *Load* is supplied by the *Mains* through the *Automatic Bypass*.
- *Rectifier* starts automatically.
  LED 1 (Rectifier) blinking, indicates *Soft-start*.
- At the end of *Rectifier Soft-start* the *LED 1 (Rectifier)* remains lit.

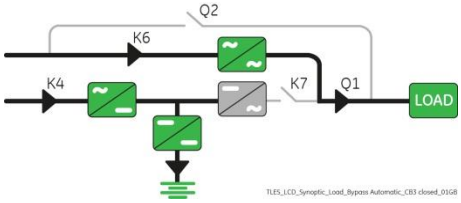
The *Synoptic Diagram* must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS***".



3. *Connect the Battery to the UPS by closing the external Battery protections and close, if present, the switch CB3 (option).*

Attention: check the right DC polarities on both side of the switch/fuse holder!

NOTE !
Ensure the *LED1 (Rectifier)* is lit before carrying out this procedure.
It indicates that the DC-Link has reached 800Vdc (see screen *MEASURES / Rectifier*)!
Before performing the next procedure make sure that the LED 3 *(Booster/Battery charger)* is lit.

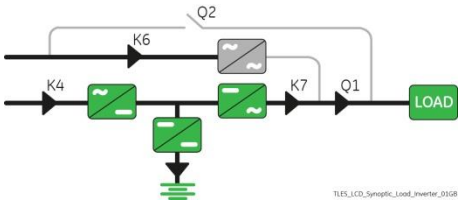


4. *Insert the inverter performing the command "Inverter ON".*

Perform the *"Inverter ON"* command from the screen: *Commands 1 / Inverter /* ***ON***.

- *Soft-start* of *Inverter* indicated with blinking *LED 2 (Inverter)*.
- At the end of *Soft-start* the *LED 2 (Inverter)* remains lit.
- The *Load* is automatically transferred from *Automatic Bypass* to *Inverter*.
- *LED Alarm* turns Off and the *LED Load protected* must be lit.

The *Synoptic Diagram* must display the status "***LOAD SUPPLIED BY INVERTER***".



5. *Operation mode selection.*

TLE Series 160 & 200 is delivered normally selected for permanent *VFI* operation.

The *eBoost™ Operation Mode* can be enabled and the *eBoost Start Time* & *eBoost Stop Time* can be programmed for each day of the week (see *Section 7.4 SETUP / eBoost)*.

END OF PROCEDURE

NOTE !
The *Battery* must be charged for at least 10 hours, in order to ensure the full backup runtime in case of a *Mains Failure*.

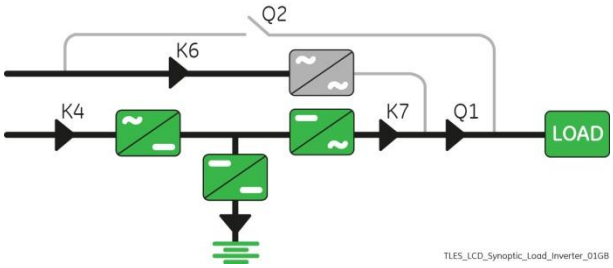
8.1.2 UPS shut-down with load transfer on Manual Bypass Q2

NOTE !

If *eBoost™* option is available, make sure that *eBoost™ Operation Mode* is disabled before starting this procedure.

Initial status:

Load supplied from Inverter.



1. Disconnect the Inverter performing the "Inverter OFF" command.

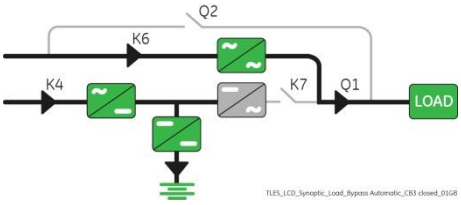
1 - Perform the "Inverter OFF" command from the screen: *Commands 1 / Inverter / **OFF***.

- *Load* is transferred to *Mains* by *Automatic Bypass*.

2 - Repeat the "Inverter OFF" command from the screen: *Commands 1 / Inverter / **OFF***.

- *Inverter* shuts down. *LED 2 (Inverter)* must be OFF.
- *LED Alarm* is lit.

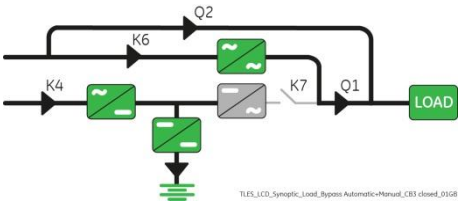
The *Synoptic Diagram* must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS***".



2. Close Manual Bypass switch Q2 (Pos. I).

- *Load* is now supplied parallel through *Automatic Bypass* and *Manual Bypass Q2*.

The *Synoptic Diagram* must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2***".



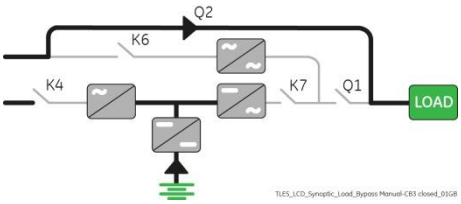
Continue ▶

3. *Open UPS output switch Q1 (Pos. O) and perform the command "System Shutdown".*

Perform the command *"System Shutdown"* through the screen: *Commands 1 / System shutdown / **Shutdown***.

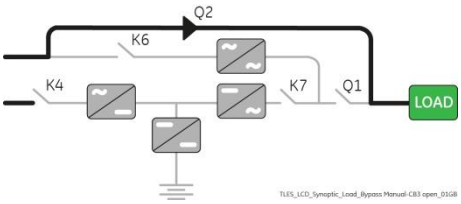
- *Load* is now supplied from *Mains by Manual Bypass Q2*.
- *Rectifier* shuts down and all *contactors* are opened.

The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY MANUAL BYPASS Q2**"*.



4. *Disconnect the Battery from the UPS by opening, if present, the switch CB3 (option) and then the external Battery protections.*

Press *"MUTE"* key to reset *Acoustical Alarm*.
LED Alarm remains lit.



END OF PROCEDURE

DANGER !

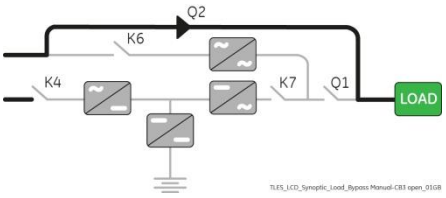
The UPS cabinet contains parts electrically live.

Apart from the front door, do not open any other part of the UPS.

8.1.3 From Manual Bypass Q2 to normal function VFI

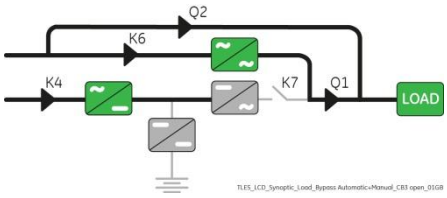
Initial status:

Load supplied from Manual Bypass Q2.



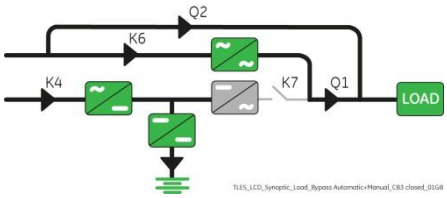
1. ***Close UPS output switch Q1 (Pos. I).***
   - *Load* is now supplied parallel through *Automatic Bypass* and *Manual Bypass Q2*.
   - *Rectifier* starts automatically.
     LED 1 (Rectifier) blinking, indicates *Soft-start*.
   - At the end of *Rectifier Soft-start* the *LED 1 (Rectifier)* remains lit.

   The *synoptic diagram* must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2***".



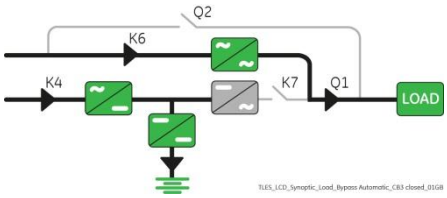
3. ***Connect the Battery to the UPS by closing the external Battery protections and close, if present, the switch CB3 (option).***

⚠	**NOTE !** **Ensure the *LED1 (Rectifier)* is lit before carrying out this procedure.** **It indicates that the DC-Link has reached 800Vdc (see screen *MEASURES / Rectifier*)!** **Before performing the next procedure make sure that the *LED 3 (Booster/Battery charger)* is lit.**



3. ***Open Manual Bypass switch Q2 (Pos. O).***
   - The *Load* is supplied by the *Mains* through the *Automatic Bypass*.

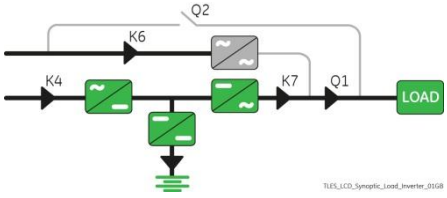
   The *synoptic diagram* must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS***".



4. ***Insert the inverter performing the command "Inverter ON".***
   Perform the "*Inverter ON*" command from the screen:
   Commands 1 / Inverter / ***ON***.

   - *Soft-start* of *Inverter* indicated with blinking *LED 2 (Inverter)*.
   - At the end of *Soft-start* the *LED 2 (Inverter)* remains lit.
   - The *Load* is automatically transferred from *Automatic Bypass* to *Inverter*.
   - *LED Alarm* turns Off and the *LED Load Protected* must be lit.

   The *Synoptic Diagram* must display the status "***LOAD SUPPLIED BY INVERTER***".



END OF PROCEDURE

8.1.4 Complete UPS shut-down

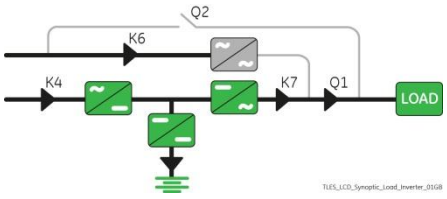
NOTE !

Follow this procedure only in case the UPS system and the *Load* must be completely powered-down.

If *eBoost™* option is available, make sure that *eBoost™ Operation Mode* is disabled before starting this procedure.

Initial status:

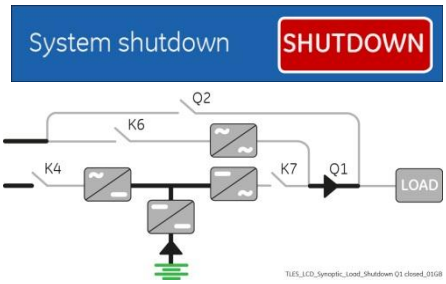
Load supplied from Inverter.



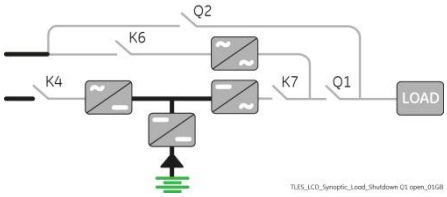
1. ***Perform the command "System Shutdown".***

   Perform the command "*System Shutdown*" through the screen: *Commands 1 / System shutdown / **Shutdown***.

   - *Load* is disconnected from *UPS*.
   - *Rectifier* and *Inverter* are shut down and all *contactors* are opened.
   - *LED 1 (Rectifier) and LED 2 (Inverter)* are OFF.
   - *LED Alarm* is lit.



2. ***Open UPS output switch Q1 (Pos. O).***



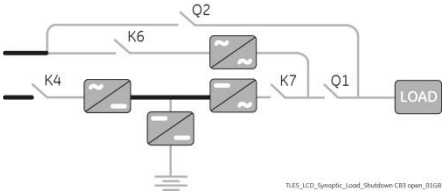
3. ***Disconnect the Battery from the UPS by opening, if present, the switch CB3 (option) and then the external Battery protections.***

NOTE !

Before performing the next procedure wait 5 minutes for *DC-Link Capacitors* discharge.

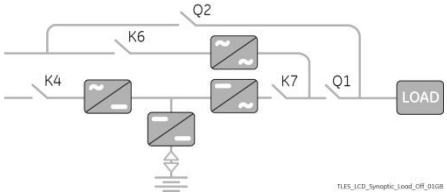
Use the *MEASURES/RECTIFIER* screen to ensure that the *DC-link1 and DC-link 2* voltage has reached 10Vdc.

Press "*MUTE*" key to reset *Acoustical Alarm*.
LED Alarm remains lit.



4. ***Disconnect the Mains from the input distribution.***

   - All *LEDs* are OFF.



END OF PROCEDURE

DANGER !

It will take 5 minutes for the *DC capacitors* to discharge.
Open only the front door, do not open any other part of the UPS.

8.1.5 Restore to normal operation after "System Shutdown"

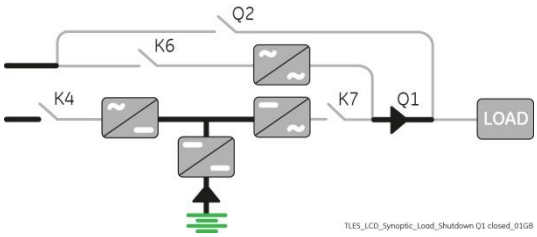
NOTE !

Make sure the UPS to be status of the activation of "*System Shutdown*", i. e. *Q1* and *CB3 (option)* closed, *Q2* open and *External Battery protection* connected.

If *eBoost*™ option is available, make sure that *eBoost*™ *Operation Mode* is disabled before starting this procedure.

View of the *Synoptic Diagram* after performed the command "*System Shutdown*":

- **All *Contactors* are open.**
- ***Rectifier*, *Inverter*, *Booster/Battery charger* and *Static-Switch* shut-down.**
- ***LED Alarm* is lit.**

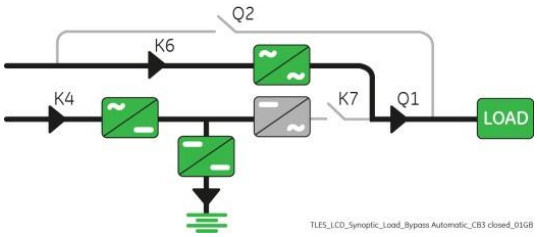


1. ***Restore the command "System Shutdown".***

   Restore the command "*System Shutdown*" through the screen: *Commands 1 / System shutdown / **Reset***.

   - The *Load* is supplied by the *Mains* through the *Automatic Bypass*.
   - *Rectifier* starts automatically.
     LED 1 (Rectifier) blinking, indicates *Soft-start*.
   - At the end of *Rectifier Soft-start* the *LED 1 (Rectifier)* remains lit.

   The *Synoptic Diagram* must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS***".



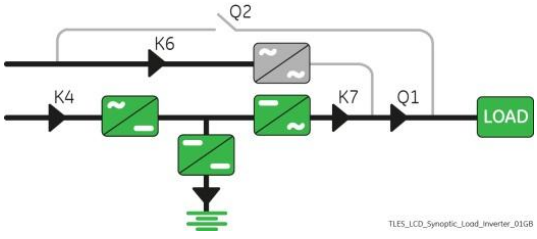
2. ***Insert the inverter performing the command "Inverter ON".***

   Before performing this procedure make sure that the *LED 1 (Rectifier)* and *LED 3 (Booster/Battery charger)* are lit.

   Perform the "*Inverter ON*" command from the screen: *Commands 1 / Inverter / **ON***.

   - *Soft-start* of *Inverter* indicated with blinking *LED 2 (Inverter)*.
   - At the end of *Soft-start* the *LED 2 (Inverter)* remains lit.
   - The *Load* is automatically transferred from *Automatic Bypass* to *Inverter*.
   - *LED Alarm* turns Off and the *LED Load protected* must be lit.

   The *Synoptic Diagram* must display the status "***LOAD SUPPLIED BY INVERTER***".



END OF PROCEDURE

8.1.6 Restore to normal operation after EPO (Emergency Power Off)

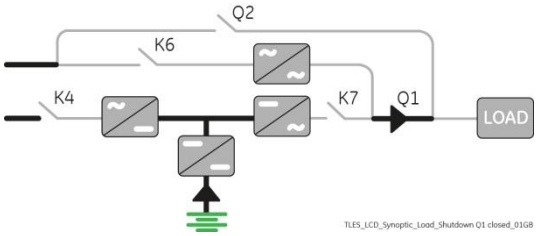
NOTE !

Make sure the UPS to be status of the activation of *EPO*, i. e. *Q1* and *CB3 (option)* closed, *Q2* open and *external Battery protection* connected.

If *eBoost™* option is available, make sure that *eBoost™ Operation Mode* is disabled before starting this procedure.

View of the *Synoptic Diagram* after activation of *EPO (Emergency Power Off)* with *Mains* available:

- **All *Contactors* are open.**
- ***Rectifier*, *Inverter*, *Booster/Battery charger* and *Static-Switch* shut-down.**
- ***LED Alarm* is lit.**



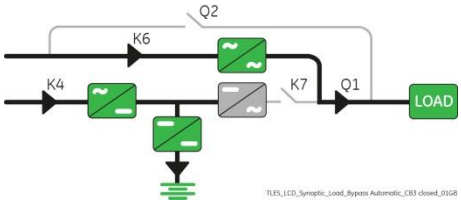
1. ***Reset the EPO (Emergency Power Off) button.***
   - Press *"MUTE"* key to reset *Alarm* and *Acoustical Alarm*.
   - *LED Alarm* remains lit.

2. ***Perform the "Inverter OFF" command.***

   Perform the "Inverter OFF" command from the screen: *Commands 1 / Inverter / **OFF***.

   - *Load* is transferred to *Mains* by *Automatic Bypass*.
   - *Rectifier* starts automatically.
     LED 1 (Rectifier) blinking, indicates *Soft-start*.
   - At the end of *Rectifier Soft-start* the *LED 1 (Rectifier)* remains lit.

   The *synoptic diagram* must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS**"*.



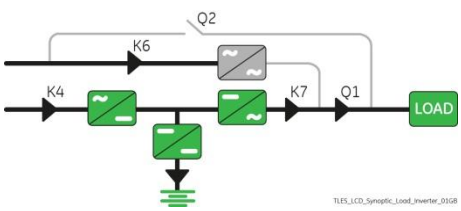
3. ***Insert the inverter performing the command "Inverter ON".***

   Before performing this procedure make sure that the *LED 1 (Rectifier)* and *LED 3 (Booster/Battery charger)* are lit.

   Perform the *"Inverter ON"* command from the screen: *Commands 1 / Inverter / **ON***.

   - *Soft-start* of *Inverter* indicated with blinking *LED 2 (Inverter)*.
   - At the end of *Soft-start* the *LED 2 (Inverter)* remains lit.
   - The *Load* is automatically transferred from *Automatic Bypass* to *Inverter*.
   - *LED Alarm* turns Off and the *LED Load protected* must be lit.

   The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY INVERTER**"*.



END OF PROCEDURE

8.2 PROCEDURES SINGLE TLE SERIES 160 & 200 FUNCTIONING AS FREQUENCY CONVERTER

When the *TLE Series 160 & 200* functions as a *Frequency Converter*, the *Automatic Bypass* and *Manual Bypass* functions are disabled.
Therefore the *Load* cannot be transferred to *Mains* in case of overload, short circuit, or *Inverter* failure.
In situations where the UPS needs to be shut-down for maintenance purposes, also the *Load* must be shut-down or disconnected.

8.2.1 Initial Start-up of the TLE Series 160 & 200 as frequency converter

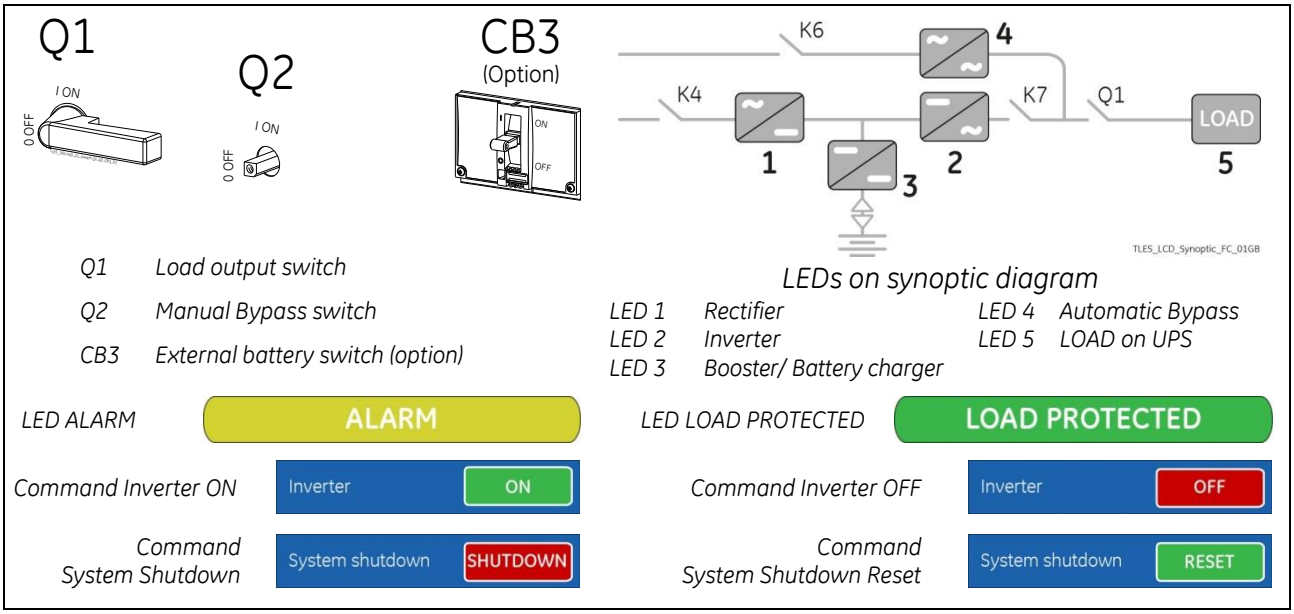
WARNING !

Before proceeding to turn on the UPS system, ensure that the *AC* and *DC external isolators* are OFF, and prevent their inadverted operation.

Ensure that the *Output Load distribution* can be powered and all the *Output Isolators* are open.

Open the front door and make sure that:

- All the ***connections*** to the input/output terminals or bus bars of the UPS have been made correctly.
- The ***safety screens*** are fixed in their position.
- The switches ***Q1*** and ***CB3 (option)*** **are open** (Pos. O) and the external ***Battery protections*** **must be open** (Pos. O).



1. *Switch-ON the Mains voltage from the input distribution.*

The UPS performs a *"Self-test"*.
A successful termination of the tests will be indicated with Overall test results *"OK"*.
Commissioning cannot be continued should one or more tests result to be negative. Please contact in this case your *Service Centre*.

At this stage the *Electronic Power Supply* and *Control Panel* are switched ON and the *Buzzer* sounds.

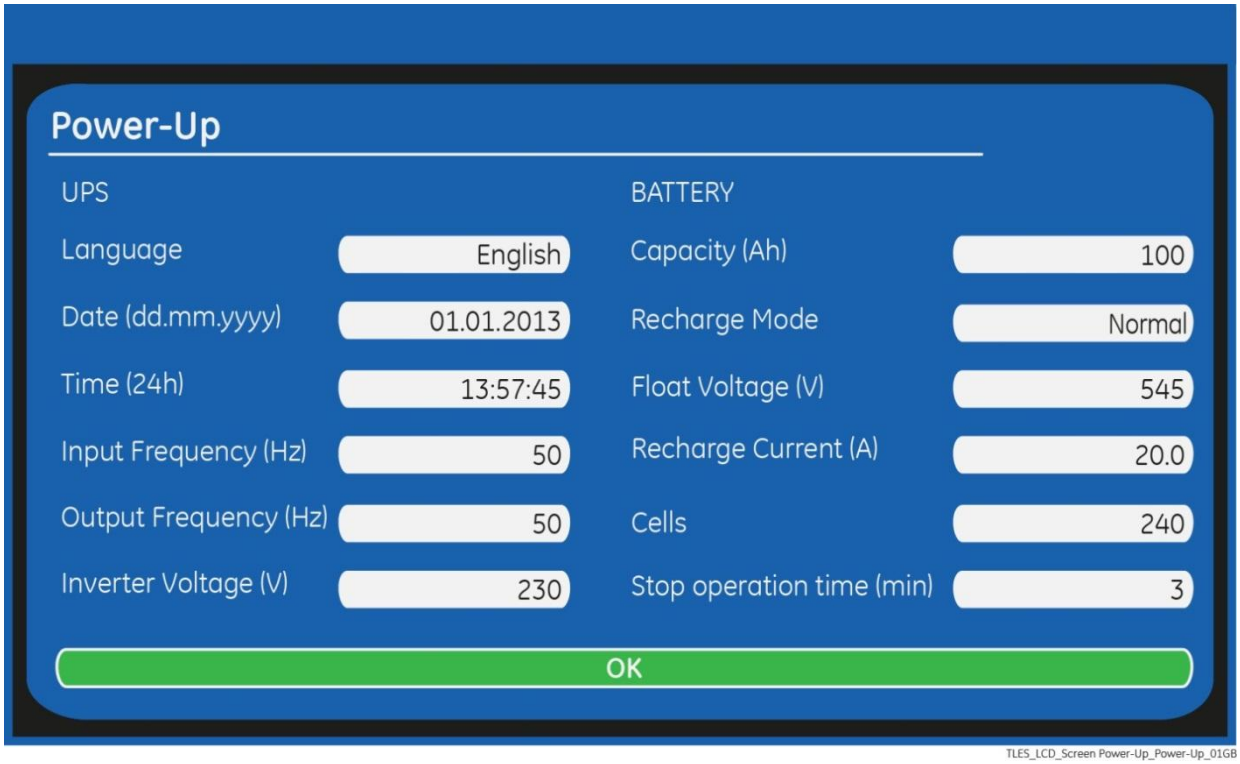
Press *"MUTE"* key to reset *Acoustical Alarm*.
LED Alarm remains lit.

Continue ▶

During the first commissioning *TLE Series 160 - 400* requests a set-up of the UPS configuration parameters presented in the following "Power-Up" screen.

Without such configuration it is not possible to continue with the commissioning procedure.

	WARNING ! **The set-up of the UPS configuration parameters must be done only by QUALIFIED AND TRAINED PERSONNEL.** **The set-up of mistaken values could compromise the integrity and reliability of the UPS.**



UPS

Language — This parameter allows the choice of language used to display the information.

Date (dd.mm.yyyy) — You can adjust the date of the real time clock existing in the UPS by the means of this parameter.
The value you enter is thoroughly checked to be a correct date in the format "*DD.MM.YY*".

Time (24h) — You can adjust the time of the real time clock existing in the UPS by means of this parameter.
The value you enter is thoroughly checked to be a correct time in the format "*HH.MM.SS*".
The time is specified in 24-hour format.

Input Frequency (Hz) — Input frequency value (50 Hz / 60Hz).

Output Frequency (Hz) — Inverter output frequency value (50 Hz / 60Hz)..

Inverter Voltage (V) — Output voltage PHASE/NEUTRAL of the inverter (220V / 230V / 240V).

Continue ▶

BATTERY

Capacity (Ah)	Ah capacity of the Battery.
Recharge Mode	Recharge type of the battery - Normal — Sealed Battery (VRLA), NiCd without boost-charge and Open Battery without boost-charge. - NiCd — Nickel Cadmium Battery with boost-charge. - Wet Lead Acid Boost — Open Battery with boost-charge.
Float Voltage (V)	Voltage to maintain battery charging. Float voltage = Number of battery cells x battery float voltage per cell. Typical battery float voltage per cell (ask the battery manufacturer for confirmation): *Sealed Battery (VRLA)*: 2.27Vdc for cell 177÷192 cells x 2.27Vdc = **402 ÷ 436Vdc** *NiCd Battery without boost-charge*: 1.41Vdc for cell 284÷309 cells x 1.41Vdc = **401 ÷ 436Vdc** *NiCd Battery with boost-charge*: 1.41 (1.55 boost-charge) Vdc for cell 281 cells x 1.41Vdc = **397** (436) **Vdc** *Open Battery without boost-charge*: 2.23Vdc for cell 180÷195 cells x 2.23Vdc = **402 ÷ 435Vdc** *Open Battery with boost-charge*: 2.23 (2.35 boost-charge) Vdc for cell 180÷185 cells x 2.23Vdc = **402** (423) ÷ **413** (435) **Vdc**
Recharge Current (A)	Maximum battery recharge current. Max 20% of battery capacity (Ah). Example: 100Ah - max recharging current 20A.
Cells	Number of cells of the Battery, see "**Float voltage**". Example: 240 battery cells - 40 blocks / 12Vdc Battery - 80 blocks / 6Vdc Battery - 240 blocks / 2Vdc Battery
Stop Operation Time (min)	Residual battery autonomy time before UPS forced shut-down. Standard set 3 minutes. Standard set 3 minutes. Settable from 1 minute to autonomy time in minutes.

NOTE !

I dati indicati sono da considerarsi valori di riferimento standard.

Gli effettivi valori da impostare sono quelli rilasciati dal fornitore della batteria.

Continue ▶

2. *Close UPS output switch Q1 (Pos. I).*

- *Rectifier* starts automatically.
  LED 1 (Rectifier) blinking, indicates *Soft-start*.
- At the end of *Rectifier Soft-start* the *LED 1 (Rectifier)* remains lit.

3. *Connect the Battery to the UPS by closing the external Battery protections and close, if present, the switch CB3 (option).*

Attention: check the right DC polarities on both side of the switch/fuse holder!

NOTE !

Ensure the *LED1 (Rectifier)* is lit before carrying out this procedure.
It indicates that the DC-Link has reached 800Vdc (see screen *MEASURES / Rectifier*)!

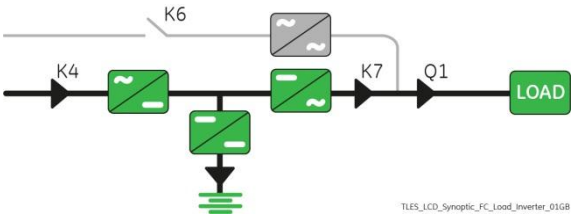
4. *Insert the inverter performing the command "Inverter ON".*

Before performing this procedure make sure that the *LED 1 (Rectifier)* and *LED 3 (Booster/Battery charger)* are lit.

Perform the *"Inverter ON"* command from the screen:
*Commands 1 / Inverter / **ON***.

- L'*inverter* inizia la fase di *Soft-start* ed il rispettivo *LED 2 (Inverter)* è acceso intermittente.
- Terminato la fase di *Soft-start* il *LED 2 (Inverter)* è acceso fisso.
- Il *carico* è automaticamente alimentato da *inverter*.
- *LED Allarme* si spegne ed il *LED Carico protetto* deve essere acceso.

Lo *schema sinottico* deve indicare uno stato di *"**CARICO ALIMENTATO DA INVERTER**"*.



END OF PROCEDURE

NOTE !

The *Battery* must be charged for at least 10 hours, in order to ensure the full backup runtime in case of a *Mains Failure*.

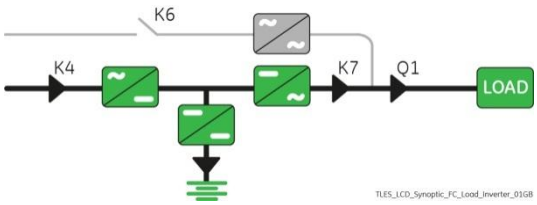
8.2.2 Complete shut-down of the TLE Series 160 & 200 as frequency converter

NOTE !

Follow this procedure only in case the UPS system and the *Load* must be completely powered-down.

Initial status:

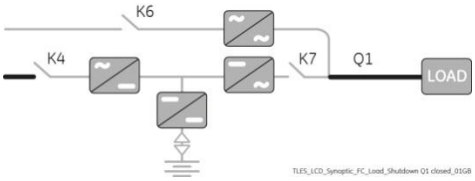
Load supplied from Inverter.



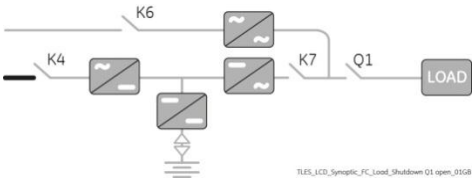
1. ***Perform the command "System Shutdown".***

   Perform the command *"System Shutdown"* through the screen: *Commands 1 / System shutdown /* ***Shutdown***

   - *Load* is disconnected from *UPS.*
   - *Rectifier* and *Inverter* are shut-down and all *contactors* are opened.
   - *LED 1 (Rectifier) and LED 2 (Inverter)* are OFF.
   - *LED Alarm* is lit.



2. ***Open UPS output switch Q1 (Pos. O).***



3. ***Disconnect the Battery from the UPS by opening, if present, the switch CB3 (option) and then the external Battery protections.***

   Press *"MUTE"* key to reset *Acoustical Alarm*. *LED Alarm* remains lit.

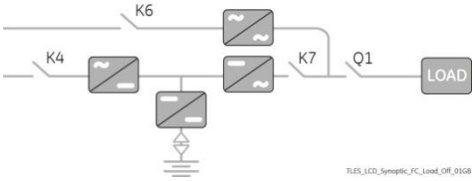
NOTE !

Before performing the next procedure wait <u>5 minutes</u> for *DC-Link Capacitors* discharge.

Use the *MEASURES/RECTIFIER* screen to ensure that the *DC-link1 and DC-link 2* voltage has reached 10Vdc.

4. ***Disconnect the Mains from the input distribution.***

   - All *LEDs* are OFF.



END OF PROCEDURE

DANGER !

It will take 5 minutes for the DC capacitors to discharge.

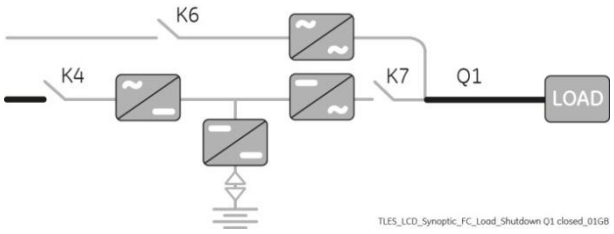
Open only the front door, do not open any other part of the UPS.

8.2.3 Restore to normal operation after "System Shutdown"

	NOTE ! **Make sure the UPS to be status of the activation of "*System Shutdown*", i. e. *Q1* and *CB3 (option)* closed and *external Battery protection* connected.**

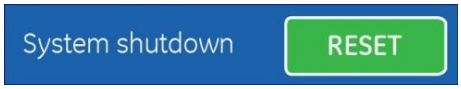
View of the *Synoptic Diagram* after performed the command "System Shutdown":

- **All *Contactors* are open.**
- ***Rectifier*, *Inverter*, *Booster/Battery charger* and *Static-Switch* shut-down.**
- ***LED Alarm* is lit.**



1. ***Restore the command "System Shutdown".***

   Restore the command *"System Shutdown"* through the screen:
   *Commands 1 / System shutdown / **Reset***



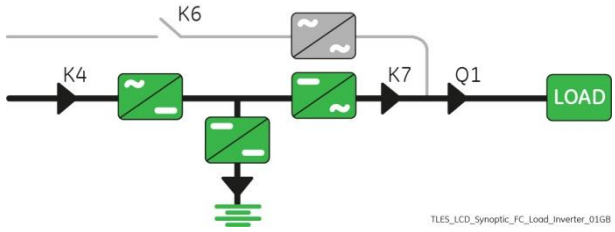
2. ***Insert the inverter performing the command "Inverter ON".***

   Before performing this procedure make sure that the *LED 1 (Rectifier)* and *LED 3 (Booster/Battery charger)* are lit.

   Perform the *"Inverter ON"* command from the screen:
   *Commands 1 / Inverter / **ON***.

   - *Soft-start* of *Inverter* indicated with blinking *LED 2 (Inverter)*.
   - At the end of *Soft-start* the *LED 2 (Inverter)* remains lit.
   - *LED Alarm* turns Off and the *LED Load protected* must be lit.

   The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY INVERTER**"*.



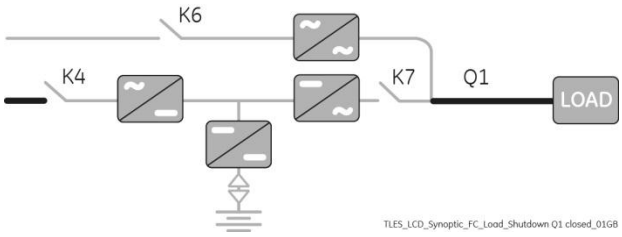
END OF PROCEDURE

8.2.4 Restore to normal operation after EPO (Emergency Power Off)

	NOTE ! **Make sure the UPS to be status of the activation of *EPO*, i. e. *Q1*, *Q3 (option)*, *Q4* closed and *external Battery protection* connected.**

View of the synoptic diagram after activation of *EPO (Emergency Power Off)* with *Mains* available:

- **All *Contactors* are open.**
- ***Rectifier*, *Inverter*, *Booster/Battery charger* and *Static-Switch* shut-down.**
- ***LED Alarm* is lit.**



1. *Reset the EPO (Emergency Power Off) button.*

- Press *"MUTE"* key to reset *Alarm* and *Acoustical Alarm*.
- *LED Alarm* remains lit.

2. *Perform the "Inverter OFF" command.*

Perform the "Inverter OFF" command from the screen: *Commands 1 / Inverter / **OFF***.

- *Rectifier* starts automatically.
  LED 1 (Rectifier) blinking, indicates *Soft-start*.
- At the end of *Rectifier Soft-start* the *LED 1 (Rectifier)* remains lit.

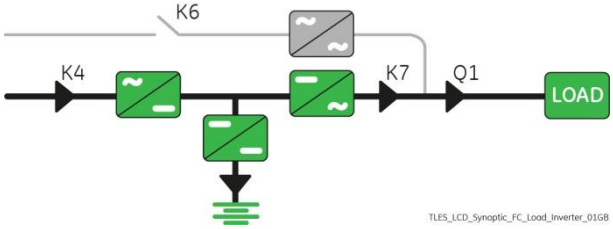
3. *Insert the inverter performing the command "Inverter ON".*

Before performing this procedure make sure that the *LED 1 (Rectifier)* and *LED 3 (Booster/Battery charger)* are lit.

Perform the *"Inverter ON"* command from the screen: *Commands 1 / Inverter / **ON***.

- *Soft-start* of *Inverter* indicated with blinking *LED 2 (Inverter)*.
- At the end of *Soft-start* the *LED 2 (Inverter)* remains lit.
- *LED Alarm* turns Off and the *LED Load protected* must be lit.

The *Synoptic Diagram* must display the status *"**LOAD SUPPLIED BY INVERTER**"*.



END OF PROCEDURE

RPA
Redundant Parallel Architecture

8.3 PROCEDURES FOR TLE SERIES 160 & 200 PARALLEL SYSTEM

8.3.1 TLE Series 160 & 200 Parallel System start-up

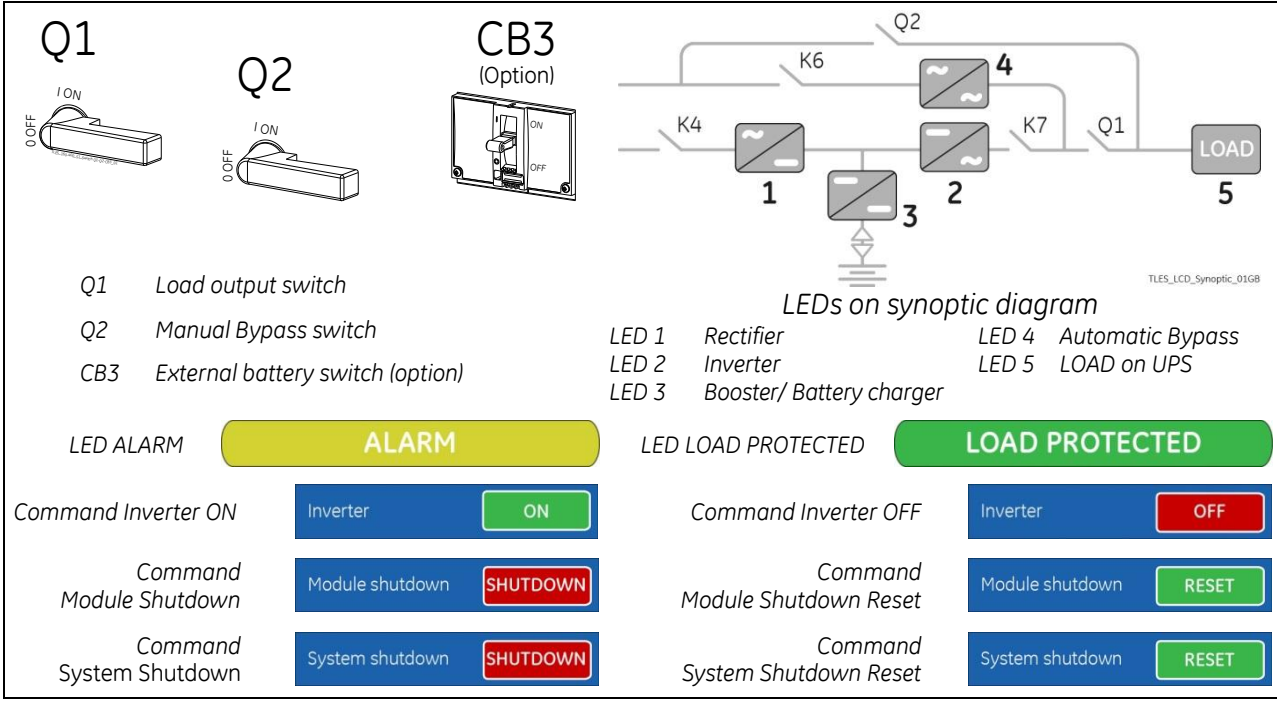
WARNING !

Before proceeding to turn on the UPS system, ensure that the *AC* and *DC external isolators* are OFF, and prevent their inadverted operation.
Ensure that the *Output Load distribution* can be powered and all the *Output Isolators* are open.

This procedure must be performed for the first start-up following the installation, with the Parallel System completely switched Off and not powered.

Open the front door on all UPS units and make sure that:

- All the ***connections*** to the input/output terminals or bus bars of the UPS have been made correctly.
- The ***safety screens*** are fixed in their position.
- The switches ***Q1***, ***Q2*** and ***CB3 (option)*** **are open** (Pos. O) and the external ***Battery protections*** **must be open** (Pos. O).

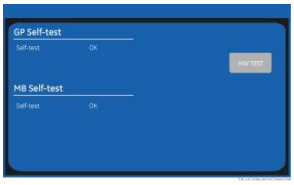


1. *Switch-ON the Mains voltage, on all UPS units, from the input distribution (both Rectifier and bypass if separated).*

The UPS performs a *"Self-test"*.
A successful termination of the tests will be indicated with Overall test results *"OK"*.
Commissioning cannot be continued should one or more tests result to be negative. Please contact in this case your *Service Centre*.

At this stage the *Electronic Power Supply* and *Control Panel* are switched ON and the *Buzzer* sounds.

Press *"MUTE"* key to reset *Acoustical Alarm*.
LED Alarm remains lit.

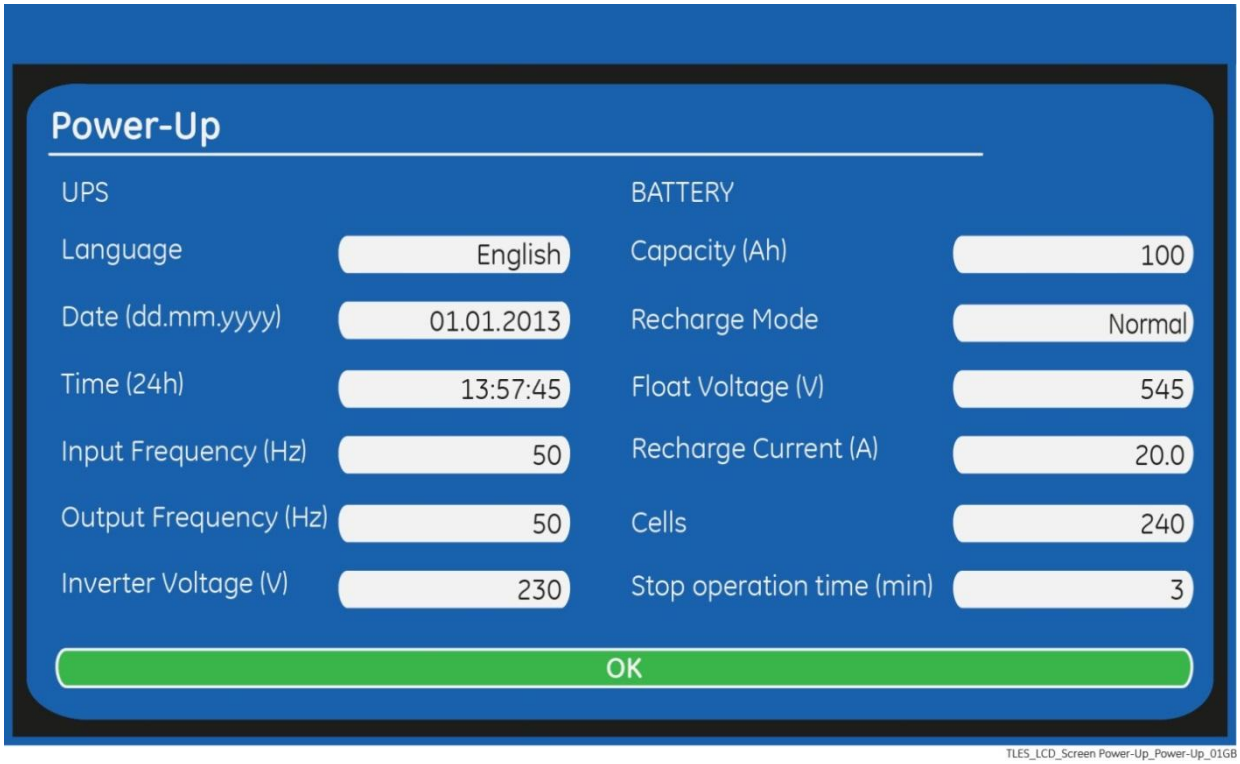


Continue ►

During the first commissioning *TLE Series 160 - 400* requests a set-up of the UPS configuration parameters presented in the following "Power-Up" screen.

Without such configuration it is not possible to continue with the commissioning procedure.

	WARNING ! **The set-up of the UPS configuration parameters must be done only by QUALIFIED AND TRAINED PERSONNEL.** **The set-up of mistaken values could compromise the integrity and reliability of the UPS.**



UPS

Language — This parameter allows the choice of language used to display the information.

Date (dd.mm.yyyy) — You can adjust the date of the real time clock existing in the UPS by the means of this parameter.
The value you enter is thoroughly checked to be a correct date in the format *"DD.MM.YY"*.

Time (24h) — You can adjust the time of the real time clock existing in the UPS by means of this parameter.
The value you enter is thoroughly checked to be a correct time in the format *"HH.MM.SS"*.
The time is specified in 24-hour format.

Input Frequency (Hz) — Input frequency value (50 Hz / 60Hz).

Output Frequency (Hz) — Inverter output frequency value (50 Hz / 60Hz)..

Inverter Voltage (V) — Output voltage PHASE/NEUTRAL of the inverter (220V / 230V / 240V).

Continue ▶

BATTERY

Capacity (Ah)	Ah capacity of the Battery.
Recharge Mode	Recharge type of the battery - Normal — Sealed Battery (VRLA), NiCd without boost-charge and Open Battery without boost-charge. - NiCd — Nickel Cadmium Battery with boost-charge. - Wet Lead Acid Boost — Open Battery with boost-charge.
Float Voltage (V)	Voltage to maintain battery charging. Float voltage = Number of battery cells x battery float voltage per cell. Typical battery float voltage per cell (ask the battery manufacturer for confirmation): *Sealed Battery (VRLA)*: 2.27Vdc for cell 177÷192 cells x 2.27Vdc = **402 ÷ 436Vdc** *NiCd Battery without boost-charge*: 1.41Vdc for cell 284÷309 cells x 1.41Vdc = **401 ÷ 436Vdc** *NiCd Battery with boost-charge*: 1.41 (1.55 boost-charge) Vdc for cell 281 cells x 1.41Vdc = **397** (436) **Vdc** *Open Battery without boost-charge*: 2.23Vdc for cell 180÷195 cells x 2.23Vdc = **402 ÷ 435Vdc** *Open Battery with boost-charge*: 2.23 (2.35 boost-charge) Vdc for cell 180÷185 cells x 2.23Vdc = **402** (423) ÷ **413** (435) **Vdc**
Recharge Current (A)	Maximum battery recharge current. Max 20% of battery capacity (Ah). Example: 100Ah - max recharging current 20A.
Cells	Number of cells of the Battery, see "**Float voltage**". Example: 240 battery cells - 40 blocks / 12Vdc Battery - 80 blocks / 6Vdc Battery - 240 blocks / 2Vdc Battery
Stop Operation Time (min)	Residual battery autonomy time before UPS forced shut-down. Standard set 3 minutes. Standard set 3 minutes. Settable from 1 minute to autonomy time in minutes.

NOTE !

I dati indicati sono da considerarsi valori di riferimento standard.

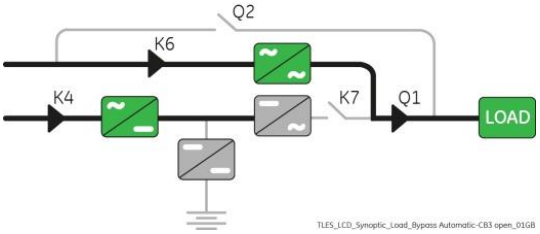
Gli effettivi valori da impostare sono quelli rilasciati dal fornitore della batteria.

Continue ▶

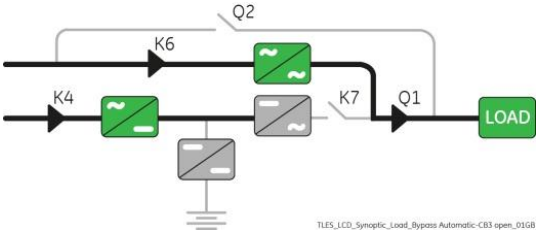
2. *Close UPS output switch Q1 (Pos. I) on all Units.*

- When closing *UPS output switch Q1* on the last unit of the *Parallel System*, the *Automatic Bypass* of all *Units* connects to the *Load*.
- *Rectifiers* start automatically, blinking *LED 1 (Rectifier)* indicates *Soft-start*.
- At the end of *Rectifier Soft-start*, the *LED 1 (Rectifier)* remains lit.

The *Synoptic Diagram*, on all UPS units, must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS***".



Synoptic Diagram of first unit



Synoptic Diagram of other units

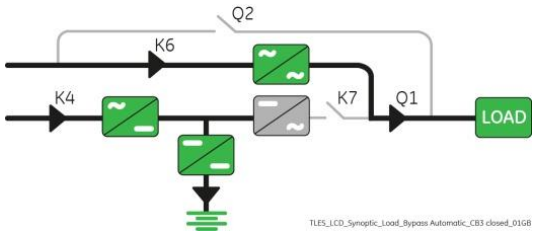
3. *Connect the Battery on all Units by closing the external Battery protections and close, if present, the switch CB3 (option).*

Attention: check the right DC polarities on both side of the switch/fuse holder!

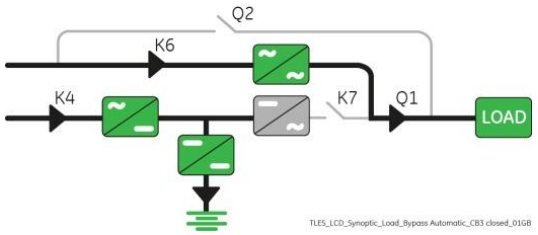
NOTE !

Ensure the *LED1 (Rectifier)* is lit before carrying out this procedure.
It indicates that the DC-Link has reached 800Vdc (see screen *MEASURES / Rectifier)*!

Before performing the next procedure make sure that the LED 3 *(Booster/Battery charger)* is lit.



Synoptic Diagram of first unit

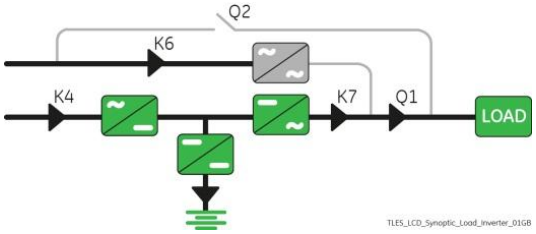


Synoptic Diagram of other units

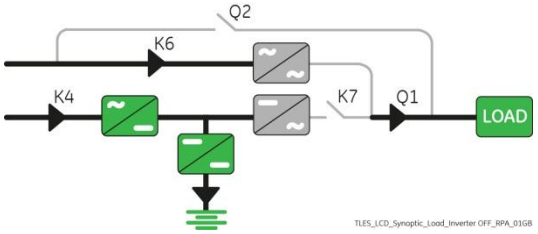
4. *Insert the Inverter performing the "Inverter ON" command on first unit.*

Perform the *"Inverter ON"* command from the screen: *Commands 1 / INVERTER /* ***ON***.

- *Soft-start* of *Inverter*, indicated with blinking *LED 2 (Inverter)*.
- At the end of *Soft-start* the *LED 2 (Inverter) remains* lit.
- In case of sufficient output power, the output will transfer to *Inverter*.
- *LED Alarm* turns Off and the *LED Load protected* must be lit.



Synoptic Diagram of first unit



Synoptic Diagram of other units

Continue ►

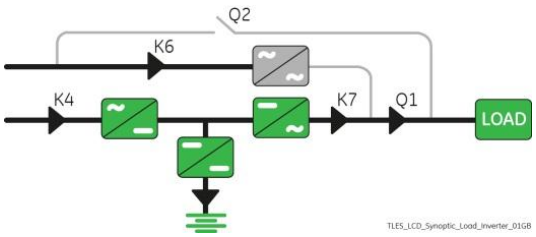
5. *Insert the Inverter performing the "Inverter ON" command on all other units.*

Do not start the next *Inverter* until the sequence of the previous ends.

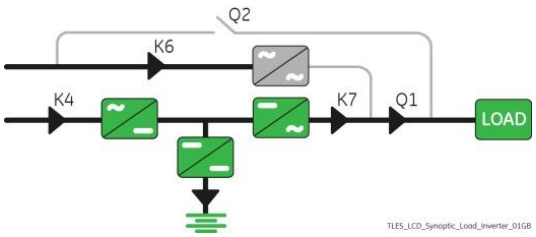
Perform the *"Inverter ON"* command from the screen: *Commands 1 / INVERTER / **ON***.

- *Soft-start* of *Inverter* indicated with blinking *LED 2 (Inverter)*.
- At the end of Soft-start the *LED 2 (Inverter)* remains lit.
- As soon as the output power of the *Inverters* is sufficient to supply the *Load*, the output of the units with running *Inverter* will transfer to *Inverter*.
- *LED Alarm* turns Off and the *LED Load protected* must be lit.

The *Synoptic Diagram*, on all UPS units, must display the status *"**LOAD SUPPLIED BY INVERTER**"*.



Synoptic Diagram of first unit



Synoptic Diagram of other units

5. *Operation mode selection.*

TLE Series 160 & 200 is delivered normally selected for permanent *VFI* operation.

The *eBoost™ Operation Mode* can be enabled and the *eBoost Start Time* & *eBoost Stop Time* can be programmed for each day of the week (see *Section 7.4 SETUP / eBoost)*.

END OF PROCEDURE

NOTE !

The *Battery* must be charged for at least 10 hours, in order to ensure the full backup runtime in case of a *Mains Failure*.

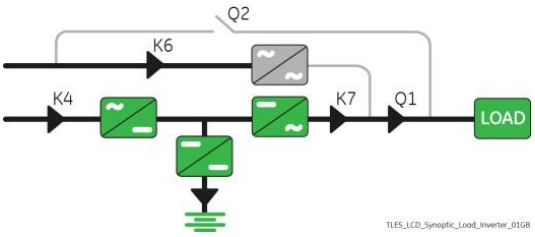
8.3.2 Parallel UPS shut-down with load transfer on Manual Bypass Q2

NOTE !

If *eBoost*™ option is available, make sure that *eBoost*™ *Operation Mode* is disabled before starting this procedure.

Initial status:

Load supplied from all Inverters of the Parallel System.



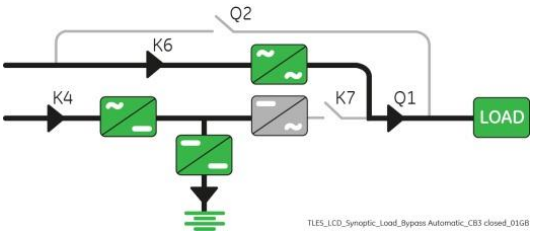
1. Disconnect the Inverter performing the "Inverter OFF" command on all Units.

1 - Perform the "Inverter OFF" command from the screen: *Commands 1 / Inverter / **OFF***.

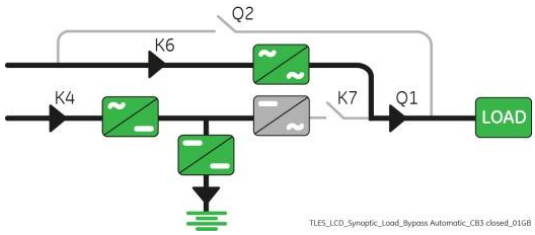
2 - Repeat the "Inverter OFF" command from the screen: *Commands 1 / Inverter / **OFF***.

- At no redundancy, the system will transfer to *Mains* supply. *LED 2 (Inverter)* is Off.
- *LED Alarm* is lit.

The *Synoptic Diagram*, on all UPS units, must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS***".



Synoptic Diagram of first unit

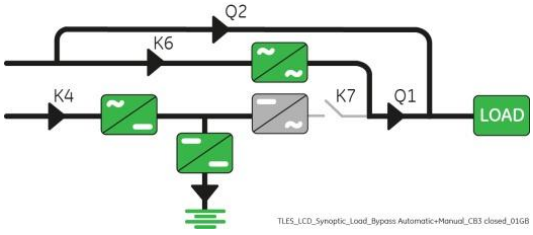


Synoptic Diagram of other units

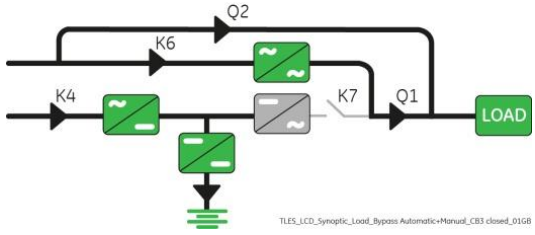
2. Close Manual Bypass switch Q2 (Pos. I) on all Units.

- *Load* is now supplied from *Mains* in parallel from *Automatic Bypass* and *Manual Bypass Q2* of all *Units*.

The *synoptic diagram*, on all UPS units, must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2***".



Synoptic Diagram of first unit



Synoptic Diagram of other units

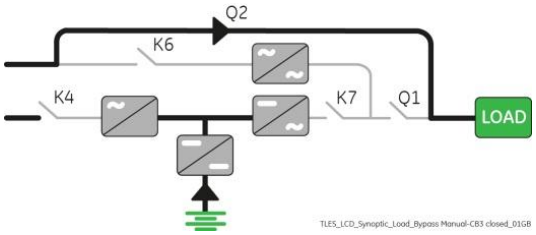
Continue ►

3. *Open UPS output switch Q1 (Pos. O) and perform the command "System Shutdown" on all Units.*

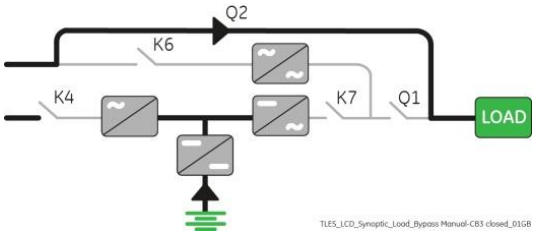
Perform the command *"System Shutdown"* through the screen: *Commands 1 / System shutdown / **Shutdown***.

- The *Load* is now supplied only through the *Manual Bypass Q2* of all *Units*.
- All *Rectifiers* are shut-down and all output and input *contactors* are opened.

The *Synoptic Diagram*, on all UPS units, must display the status *"**LOAD SUPPLIED BY MANUAL BYPASS Q2**"*.



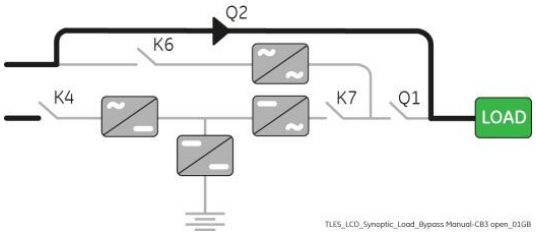
Synoptic Diagram of first unit



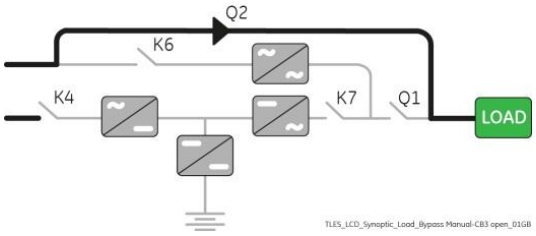
Synoptic Diagram of other units

4. *Disconnect the Battery on all Units by opening, if present, the switch CB3 (option) and then the external Battery protections.*

Press *"MUTE"* key to reset *Acoustical Alarm*. *LED Alarm* remains lit.



Synoptic Diagram of first unit



Synoptic Diagram of other units

END OF PROCEDURE

DANGER !

The UPS cabinet contains parts electrically live.

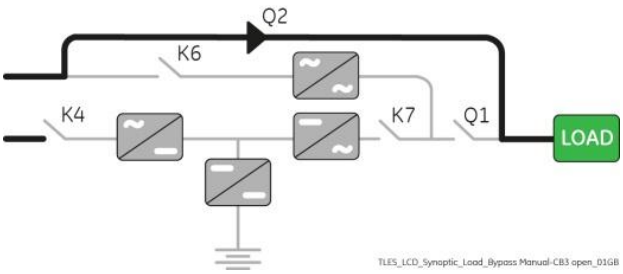
Apart from the front door, do not open any other part of the UPS.

8.3.3 From Manual Bypass Q2 to normal function VFI

Initial status:

Load supplied from all Manual Bypass Q2 of the Parallel System.

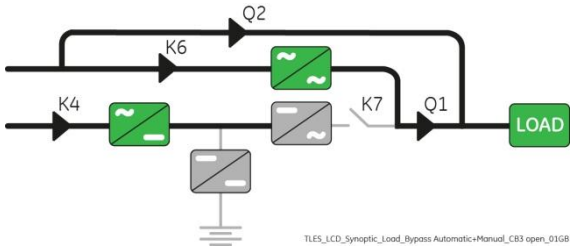
All Manual Bypass Q2 of the Parallel System are closed.



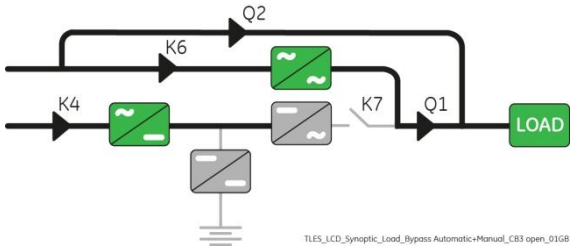
1. ***Close UPS output switch Q1 (Pos. I) on all Units.***

   - The *Rectifiers* will start automatically and at the closure of *UPS output switch Q1* of the *last Unit*, the output will be supplied parallel from *Automatic Bypass* and *Manual Bypass Q2* of all UPS units.
     I *LED 1 (Raddrizzatore ON)* sono accesi intermittente, indicando la fase di *soft-start*.
   - At the end of *Rectifiers* Soft-start, the *LEDs 1 (Rectifier)* remain lit.

   The *Synoptic Diagram*, on all UPS units, must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS AND MANUAL BYPASS Q2**"*.



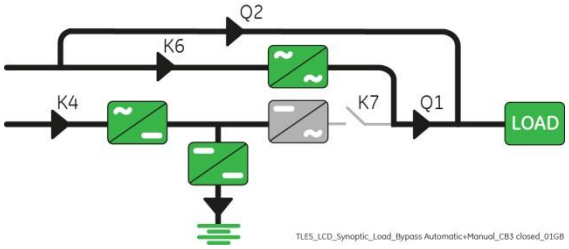
Synoptic Diagram of first unit



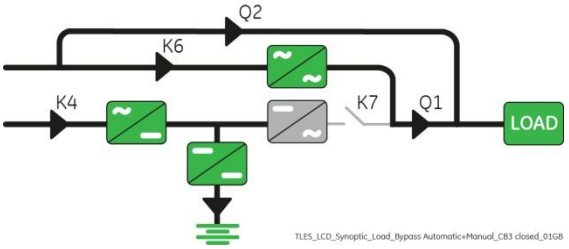
Synoptic Diagram of other units

2. ***Connect the Battery on all Units by closing the external Battery protections and close, if present, the switch CB3 (option).***

	NOTE ! **Ensure the *LED1 (Rectifier)* is lit before carrying out this procedure.** **It indicates that the DC-Link has reached 800Vdc (see screen *MEASURES / Rectifier)*!** **Before performing the next procedure make sure that the LED 3 *(Booster/Battery charger)* is lit.**



Synoptic Diagram of first unit



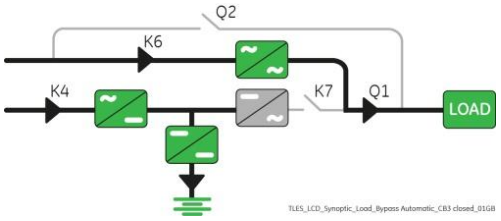
Synoptic Diagram of other units

Continue ►

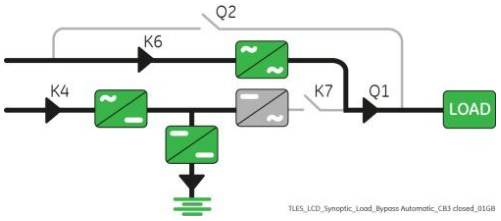
3. *Open Manual Bypass switch Q2 (Pos. O) on all Units.*

- The *Load* is supplied by the *Mains* through the *Automatic Bypass* of all *Units* of the *Parallel System*.

The *Synoptic Diagram*, on all UPS units, must display the status "***LOAD SUPPLIED BY AUTOMATIC BYPASS***".



Synoptic Diagram of first unit



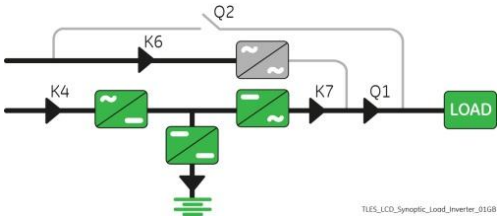
Synoptic Diagram of other units

4. *Insert the Inverter performing the "Inverter ON" command on first unit.*

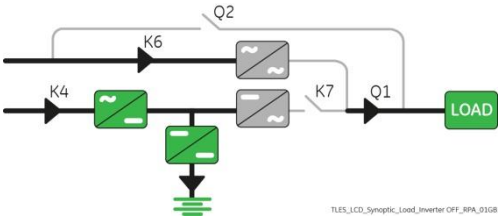
Before performing this procedure make sure that the *LED 1 (Rectifier)* and *LED 3 (Booster/Battery charger)* are lit.

Perform the *"Inverter ON"* command from the screen:
Commands 1 / Inverter / ***ON***.

- *Soft-start* of *Inverter*, indicated with blinking *LED 2 (Inverter)*.
- At the end of *Soft-start* the *LED 2 (Inverter) remains* lit.
- In case of sufficient output power, the output will transfer to *Inverter*.



Synoptic Diagram of first unit



Synoptic Diagram of other units

5. *Insert the Inverter performing the "Inverter ON" command on all other units*.

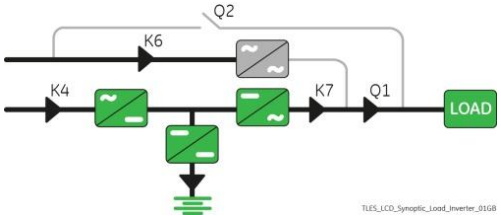
Do not start the next *Inverter* until the sequence of the previous ends.

Perform the *"Inverter ON"* command from the screen:

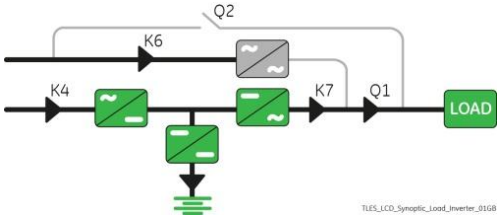
Commands 1 / Inverter / ***ON***.

- *Soft-start* of *Inverter* indicated with blinking *LED 2 (Inverter)*.
- At the end of *Soft-start* the *LED 2 (Inverter)* remains lit.
- As soon as the output power of the *Inverters* is sufficient to supply the *Load*, the output of the units with running *Inverter* will transfer to *Inverter*.
- *LED Alarm* turns Off and the *LED Load protected* must be lit.

The *Synoptic Diagram*, on all UPS units, must display the status "***LOAD SUPPLIED BY INVERTER***".



Synoptic Diagram of first unit



Synoptic Diagram of other units

END OF PROCEDURE

8.3.4 Separate a UPS unit from the Redundant Parallel System

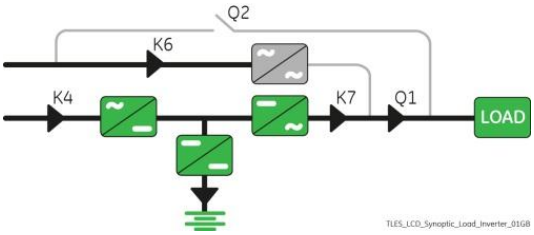
NOTE !
If *eBoost™* option is available, make sure that *eBoost™ Operation Mode* is disabled before starting this procedure.

NOTE:
The *Load* is powered by the *UPS Redundant Parallel System*.
One UPS unit of the *Parallel System* has to be turned Off, while the *Load* is shared between the other units supplying the parallel bus.

WARNING!
The control bus cable connecting *J1A - J2A* and *J1B - J2B* cannot be connected or disconnected after the system has been powered on.

Initial status:

Load supplied from all Inverters of the Redundant Parallel System.



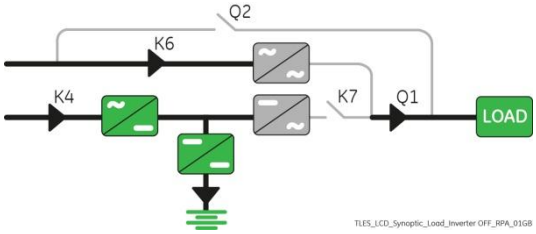
1. Disconnect the Inverter performing the "Inverter OFF" command on the Unit to separate.

1 - Perform the "Inverter OFF" command from the screen: *Commands 1 / Inverter / **OFF***.

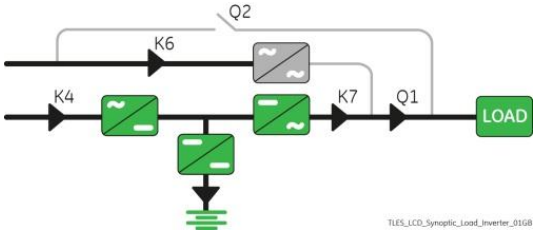
2 - Repeat the "Inverter OFF" command from the screen: *Commands 1 / Inverter / **OFF***.

With *redundant system*, performing the "Inverter OFF" command the *Inverter* shuts down and it will stay OFF. Performing the "Inverter OFF" command the *Load* is transferred to the *Mains* and the *Inverter* remains operating, it means the system is not redundant.
In this case is not possible to switch-OFF one unit without transferring the *Load* on *Mains*.

- *Load* supplied from *Inverter(s)* of the other Unit(s) of the *Parallel System*.



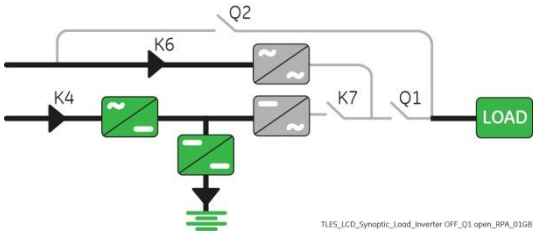
Synoptic diagram of the unit to separate



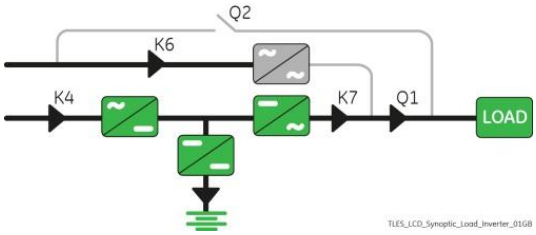
Synoptic diagram of other units

2. Open UPS output switch Q1 (Pos. O) on the Unit to separate.

- *LED Alarm* is lit.



Synoptic diagram of the unit to separate

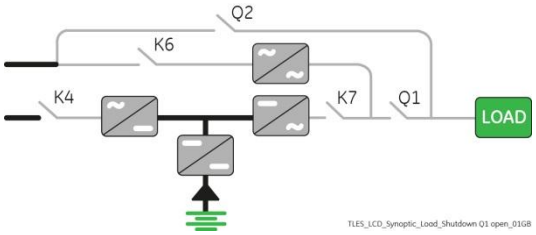


Synoptic diagram of other units

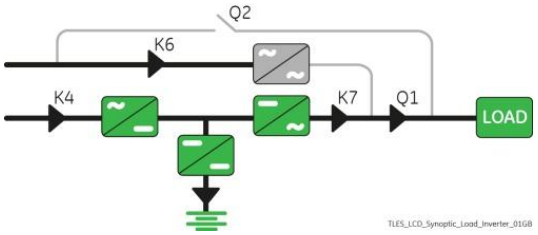
Continue ►

3. ***Perform the command "Module Shutdown" on the Unit to separate only when the symbol Q1 in the Synoptic Diagram is shown open.***

Perform the command *"Module Shutdown"* through the screen: *Commands 1 / Module shutdown /* ***Shutdown***.



Synoptic diagram of the unit to separate

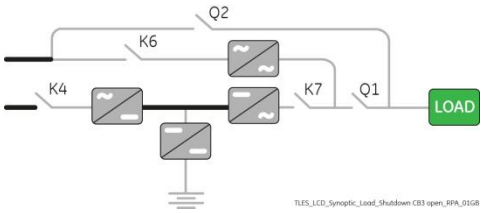


Synoptic diagram of other units

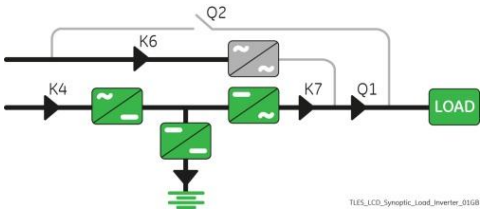
4. ***Disconnect the Battery on the Unit to separate by opening, if present, the switch CB3 (option) and then the external Battery protections.***

Press *"MUTE"* key to reset *Acoustical Alarm*. *LED Alarm* remains lit.

	NOTE ! **Before performing the next procedure wait <u>5 minutes</u> for *DC-Link Capacitors* discharge.** **Use the *MEASURES/RECTIFIER* screen to ensure that the *DC-link1 and DC-link 2* voltage has reached 10Vdc.**

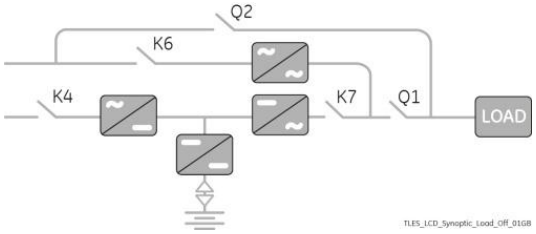


Synoptic diagram of the unit to separate

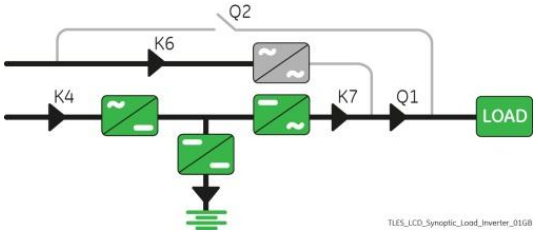


Synoptic diagram of other units

5. ***Disconnect the Utility supply on the Unit to separate.***



Synoptic diagram of the unit to separate



Synoptic diagram of other units

END OF PROCEDURE

	DANGER ! **It will take 5 minutes for the DC capacitors to discharge.** **Open only the front door, do not open any other part of the UPS.**

	NOTE ! **For any further intervention contact nearest *Service Centre*.**

8.3.5 Reconnect a UPS unit to Redundant Parallel System

NOTE:

The *Load* is still powered by the other units supplying the *parallel bus*.
This UPS unit will be powered on and connected to the *parallel bus* in order to share the *Load* with each other's.

WARNING !

The high speed bus cable connecting *J1A - J2A* and *J1B - J2B* in any case cannot be connected or disconnected after the system has been powered on.

The bus terminals must be properly connected before powering the additional unit.

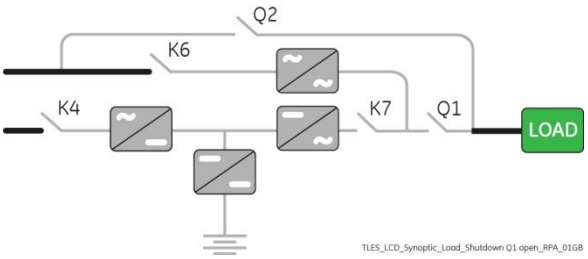
If *eBoost*™ option is available, make sure that *eBoost*™ *Operation Mode* is disabled before starting this procedure.

Open the front door, of the Unit to reconnect, and make sure that:

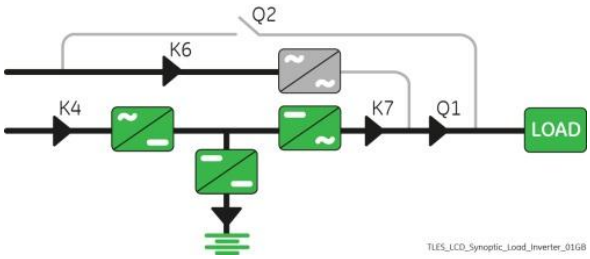
- All the ***connections*** to the input/output terminals or bus bars of the UPS have been made correctly.
- The ***protection panels*** are fastened in their correct position.
- The switches ***Q1***, ***Q2***, ***Q3 (option)*** and ***Q4* are open (Pos. O)** and the external ***Battery protections* must be open** (Pos. O).

1. Switch-ON the Mains voltage, on the Unit to reconnect, from the input distribution (both Rectifier and bypass if separated).

At this stage the *Electronic Power Supply* and *Control Panel* are switched ON and the *Buzzer* sounds.
Press *"MUTE"* key to reset *Acoustical Alarm*.
LED Alarm remains lit.



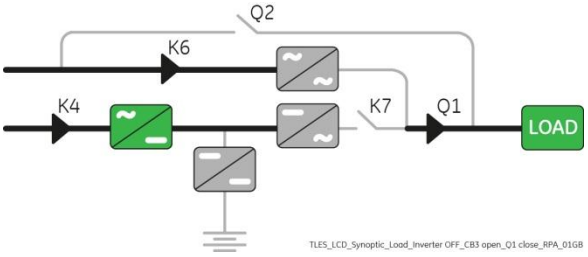
Synoptic diagram of the unit to reconnect



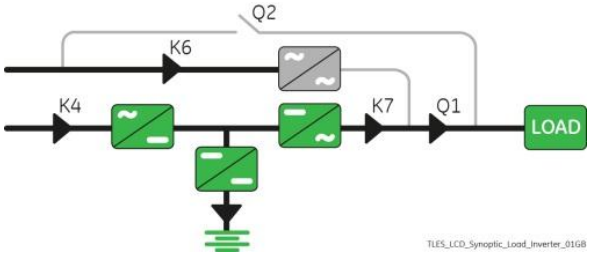
Synoptic diagram of other units

2. Close UPS output switch Q1 (Pos. I) on the Unit to reconnect.

- *Rectifier* starts automatically.
  LED 1 (Rectifier) blinking, indicates *Soft-start*.
- At the end of *Rectifier Soft-start* the *LED 1 (Rectifier)* remains lit.



Synoptic diagram of the unit to reconnect

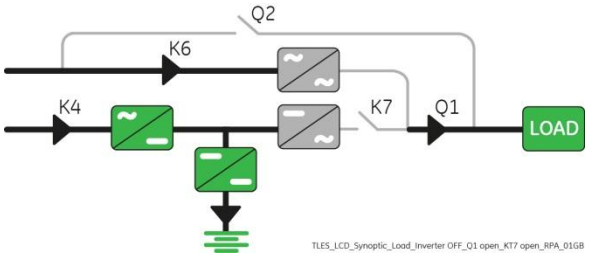


Synoptic diagram of other units

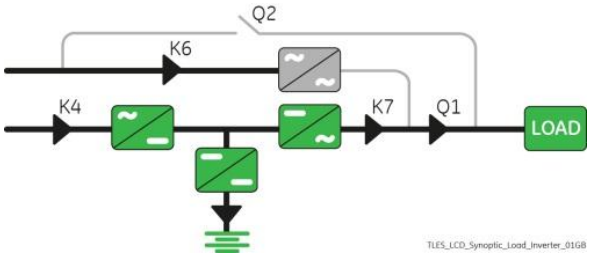
Continue ►

3. ***Connect the Battery on the Unit to reconnect by closing the external Battery protections and close, if present, the switch CB3 (option).***

	NOTE ! **Ensure the *LED1 (Rectifier)* is lit before carrying out this procedure.** **It indicates that the DC-Link has reached 800Vdc (see screen *MEASURES / Rectifier)*!** **Before performing the next procedure make sure that the LED 3 *(Booster/Battery charger)* is lit.**



Synoptic diagram of the unit to reconnect



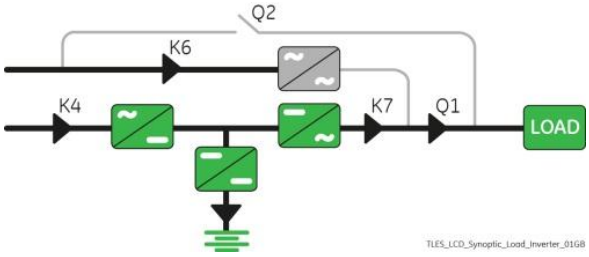
Synoptic diagram of other units

4. ***Insert the inverter performing the command "Inverter ON" on the Unit to reconnect.***

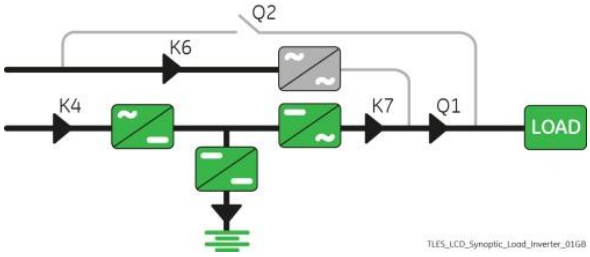
Perform the *"Inverter ON"* command from the screen:
Commands 1 / Inverter / ***ON***.

- After *Soft-start* of the *Inverter*, the *Inverter* connects automatically to the *other Units* of the *Parallel System*.
- *LED Alarm* turns Off and the *LED Load protected* must be lit.

The *Synoptic Diagram*, on all UPS units, must display the status *"**LOAD SUPPLIED BY INVERTER**"*.



Synoptic diagram of the unit to reconnect



Synoptic diagram of other units

END OF PROCEDURE

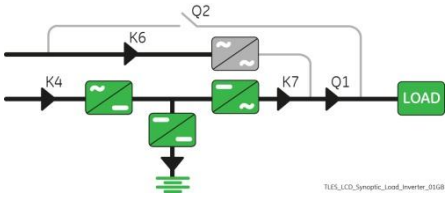
8.3.6 Complete Parallel System shut-down

NOTE !

The *UPS Parallel System* and the *Load* have to be completely powered down
If *eBoost™* option is available, make sure that *eBoost™ Operation Mode* is disabled before starting this procedure.

Initial status:

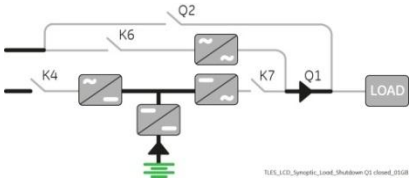
Load supplied from all Inverters of the Parallel System.



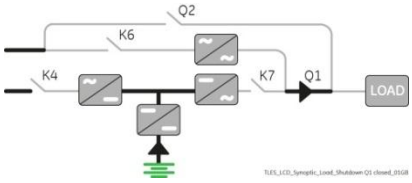
1. ***Perform the command "System Shutdown" on anyone of the units.***

   Perform the command *"System Shutdown"* through the screen: *Commands 1 / System shutdown /* ***Shutdown***.

   - *Load* is disconnected from *UPS Parallel System.*
   - *Rectifiers* and *Inverters* are shut down and all *Contactors* are opened.
   - *LED Alarm* is lit.

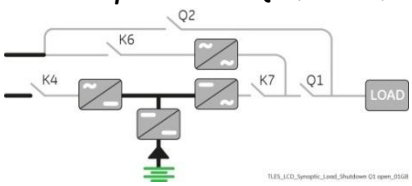
   

   Synoptic diagram of first unit

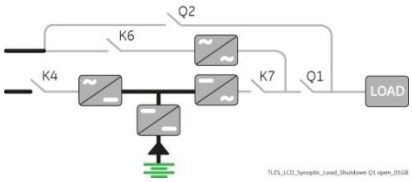
   

   Synoptic diagram of other units

2. ***Open UPS output switch Q1 (Pos. O) on all Units.***

   Synoptic diagram of first unit

   Synoptic diagram of other units

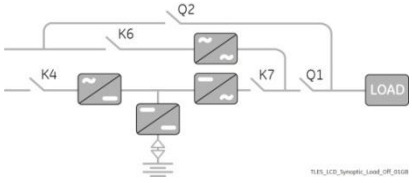
3. ***Disconnect on all Units the Battery from the UPS by opening, if present, the switch CB3 (option) and then the external Battery protections.***

   Press *"MUTE"* key to reset *Acoustical Alarm*. *LED Alarm* remains lit.

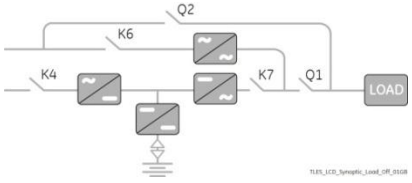
   - **Wait *5 minutes*** for DC-Link Capacitors discharge. Use the *MEASURES/RECTIFIER* screen to ensure that the *DC-link1 and DC-link 2* voltage has reached **10Vdc**.

4. ***Disconnect the Mains supply on all Units.***

   - All *LEDs* are OFF.

   Synoptic diagram of first unit

   Synoptic diagram of other units

END OF PROCEDURE

DANGER !

It will take 5 minutes for the DC capacitors to discharge.
Open only the front door, do not open any other part of the UPS.

8.3.7 Restore to normal operation after "System Shutdown"

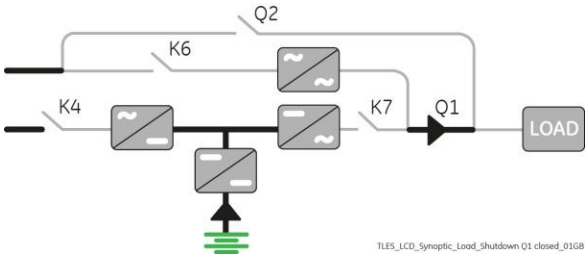
NOTE !

Make sure the all units of the *Parallel System* to be status of the activation of *"System Shutdown"*, i. e. *Q1* and *CB3 (option)* closed, *Q2* open and *External Battery Protection* connected.

If *eBoost™* option is available, make sure that *eBoost™ Operation Mode* is disabled before starting this procedure.

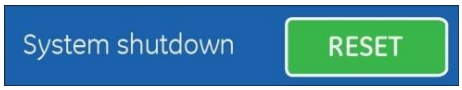
View of the *synoptic diagram*, on all UPS units, after performed the command *"System Shutdown"*:

- **All *Contactors* are open.**
- ***Rectifier*, *Inverter*, *Booster/Battery charger* and *Static-Switch* shut-down.**
- ***LED Alarm* is lit.**



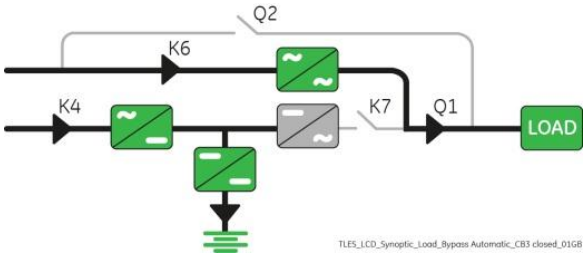
1. Restore the command "System Shutdown" of the Parallel System.

Restore the command *"System Shutdown"*, on anyone of the parallel units, through the screen: *Commands 1 / System shutdown / **Reset***.

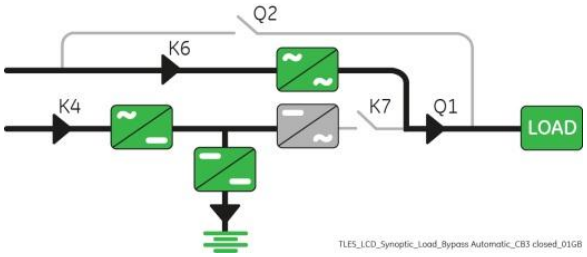


- The *Load* is supplied by the *Mains* through the *Automatic Bypass* of all *Units*.
- *Rectifiers* start automatically, blinking *LED 1 (Rectifier)* indicates Soft-start.
- At the end of *Rectifier* Soft-start, the *LED 3 (Rectifier)* remains lit.
- *LED Alarm* are lit

The *synoptic diagram*, on all UPS units, must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS**"*.



Synoptic diagram of first unit



Synoptic diagram of other units

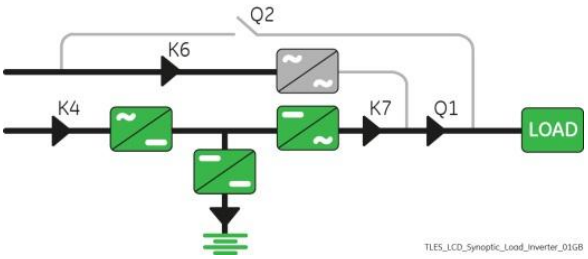
Continue ►

2. *Insert the Inverter performing the "Inverter ON" command on first unit.*

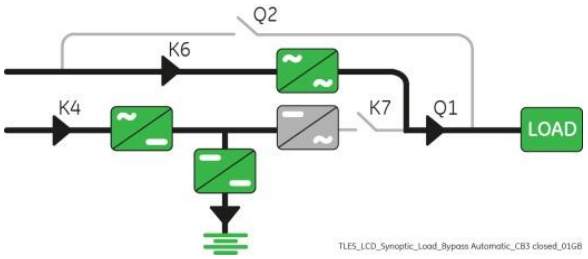
Before performing this procedure make sure that the *LED 1 (Rectifier)* and *LED 3 (Booster/Battery charger)* are lit.

Perform the *"Inverter ON"* command from the screen: *Commands 1 / Inverter / **ON***.

- *Soft-start* of *Inverter*, indicated with blinking *LED 2 (Inverter)*.
- At the end of *Soft-start* the *LED 2 (Inverter) remains* lit.
- In case of sufficient output power, the output will transfer to *Inverter*
- *LED Alarm* turns Off and the *LED Load protected* must be lit.



Synoptic diagram of first unit



Synoptic diagram of other units

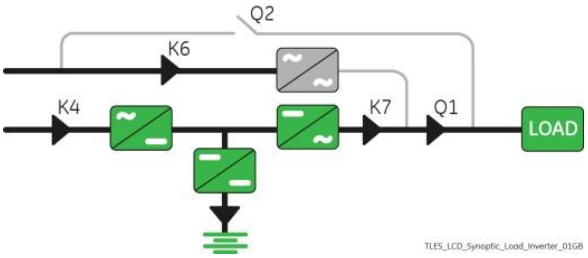
3. *Insert the Inverter performing the "Inverter ON" command on all other units*.

Do not start the next *Inverter* until the sequence of the previous ends.

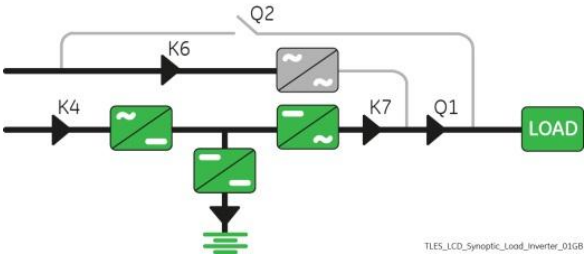
Perform the *"Inverter ON"* command from the screen: *Commands 1 / Inverter / **ON***.

- *Soft-start* of *Inverter* indicated with blinking *LED 2 (Inverter)*.
- At the end of Soft-start the *LED 2 (Inverter)* remains lit.
- As soon as the output power of the *Inverters* is sufficient to supply the *Load*, the output of the units with running *Inverter* will transfer to *Inverter*.
- *LED Alarm* turns Off and the *LED Load protected* must be lit.

The *Synoptic Diagram*, on all UPS units, must display the status *"**LOAD SUPPLIED BY INVERTER**"*.



Synoptic diagram of first unit



Synoptic diagram of other units

END OF PROCEDURE

8.3.8 Restore to normal operation after EPO (Emergency Power Off)

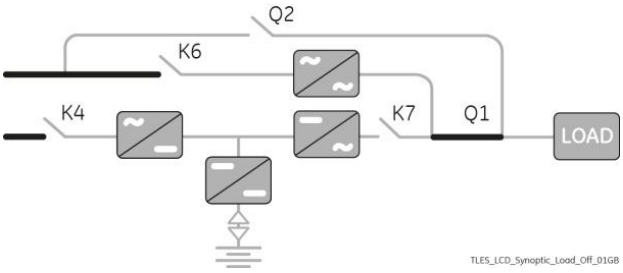
NOTE !

Make sure the all units of the *Parallel System* to be status of the activation of *EPO*, i. e. *Q1* and *CB3 (option)* closed, *Q2* open and *External Battery Protection* connected.

If *eBoost™* option is available, make sure that *eBoost™ Operation Mode* is disabled before starting this procedure.

View of the *synoptic diagram*, on all UPS units, after activation of *EPO (Emergency Power Off)* with *Mains* available:

- **All *Contactors* are open.**
- ***Rectifier*, *Inverter*, *Booster/Battery charger* and *Static-Switch* shut-down.**
- ***LED Alarm* is lit.**

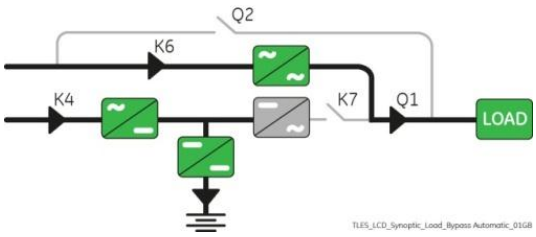


1. ***Reset the EPO (Emergency Power Off) button.***
   - Press *"MUTE"* key to reset *Alarm* and *Acoustical Alarm*.
   - *LED Alarm* remain lit.

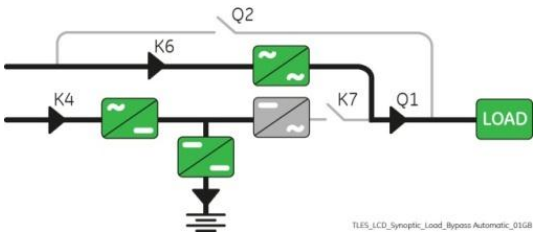
2. ***Perform the "Inverter OFF" command on all Units.***
   Perform the "Inverter OFF" command from the screen: *Commands 1 / Inverter / **OFF***.

   - *Rectifiers* start automatically.
     LEDs 1 (Rectifier) blinking, indicates *Soft-start*.
   - After performed the "Inverter OFF" command on the last unit of the *Parallel System*, the output of all *Units* connect to *Automatic Bypass*.

   The *Synoptic Diagram*, on all UPS units, must display the status *"**LOAD SUPPLIED BY AUTOMATIC BYPASS**"*.



Synoptic diagram of first unit



Synoptic diagram of other units

Continue ►

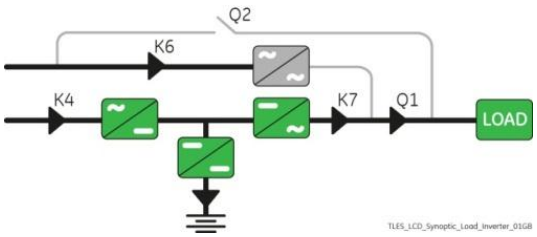
3. *Insert the Inverter performing the "Inverter ON" command on first unit.*

Before performing this procedure make sure that the *LED 1 (Rectifier)* and *LED 3 (Booster/Battery charger)* are lit.

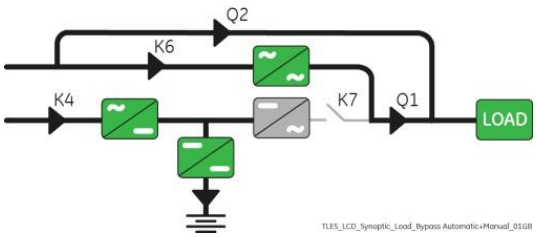
Perform the *"Inverter ON"* command from the screen:
*Commands 1 / Inverter / **ON***.

Soft-start of *Inverter*, indicated with blinking *LED 2 (Inverter)*.

- At the end of *Soft-start* the *LED 2 (Inverter) remains* lit.
- In case of sufficient output power, the output will transfer to *Inverter*
- *LED Alarm* turns Off and the *LED Load protected* must be lit.



Synoptic diagram of first unit



Synoptic diagram of other units

4. *Insert the Inverter performing the "Inverter ON" command on all other units*.

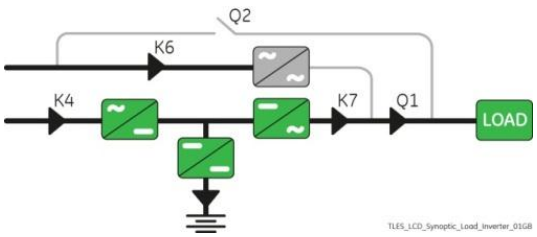
Do not start the next *Inverter* until the sequence of the previous ends.

Perform the *"Inverter ON"* command from the screen:
*Commands 1 / Inverter / **ON***.

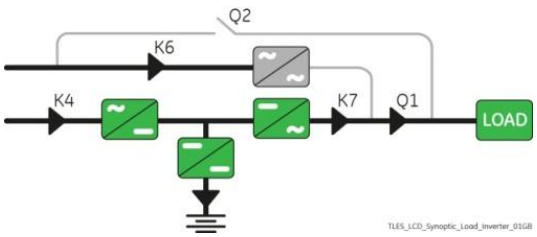
Do not start the next *Inverter* until the sequence of the previous ends.

- *Soft-start* of *Inverter* indicated with blinking *LED 2 (Inverter)*.
- At the end of Soft-start the *LED 2 (Inverter)* remains lit.
- As soon as the output power of the *Inverters* is sufficient to supply the *Load*, the output of the units with running *Inverter* will transfer to *Inverter*.
- *LED Alarm* turns Off and the *LED Load protected* must be lit.

The *Synoptic Diagram*, on all UPS units, must display the status *"**LOAD SUPPLIED BY INVERTER**"*.



Synoptic diagram of first unit



Synoptic diagram of other units

END OF PROCEDURE

9 CUSTOMER INTERFACE

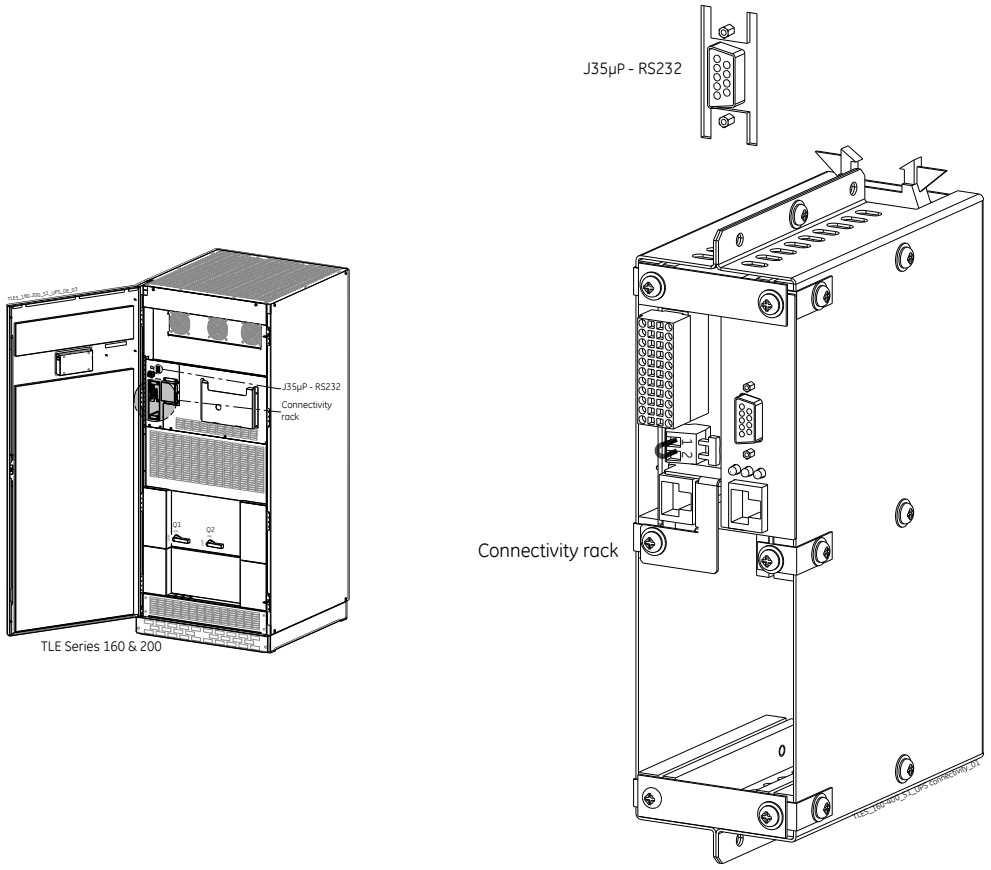


Fig. 9-1 Connectivity rack and Serial port J35µP – RS232

TLE Series 160 & 200 has the following equipment's:

- ***Serial Port J35µP - RS232*** (see *Section 9.1).*
- ***Connectivity rack*** ready for the installation of four connectivity boards [max. two boards *"Customer Interface"* (see *Section 9.2)* and max. two boards *"3-ph SNMP/WEB Plug-in Adapter"* as described in the picture below].

Possible connectivity configurations with TLE Series 160 & 200

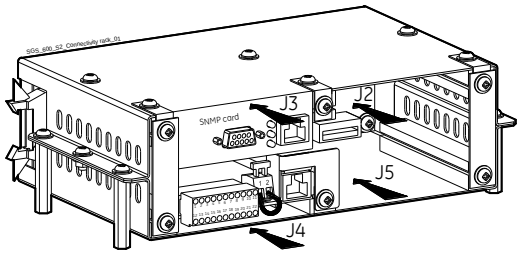


Fig. 9-2 Connectivity rack

Slot J2 2nd *3-ph SNMP/WEB plug-in adapter* (option)

Slot J3 1st *3-ph SNMP/WEB plug-in adapter* (option)

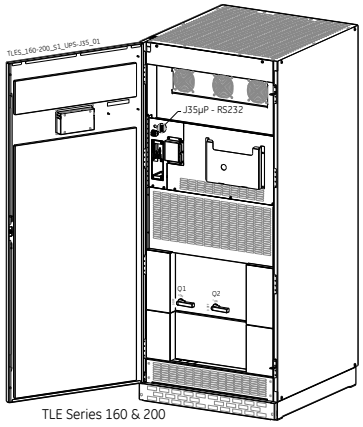
Slot J4 1st *Customer Interface board* (standard)

Slot J5 2nd *Customer Interface board* (option)

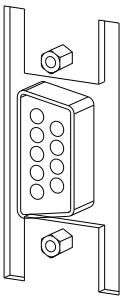
ATTENTION !

The installation of any option board must be performed when the UPS is COMPLETELY POWERED DOWN.

9.1 SERIAL PORT J35µP - RS232 (SUB D, FEMALE 9 PIN)



J35µP - RS232



Serial Port *J35µP - RS232* for IMV protocol

Total remote management of the system using software *GE iUPSGuard, GE Data Protection* or *GE Service Software* for system protection and management of the UPS systems.

Fig. 9.1-1 Serial Port J35µP – RS232

Connection of a serial printer

From the display panel it is possible to select printing of measurements, alarms and parameters (see *Section 7.4 – SETUP / Printer).*

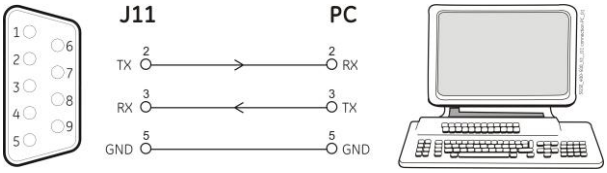


Fig. 9.1-2 Serial port J35µP connection to PC with RS232 1:1 cable DB9m – DB9f

RPA
Redundant Parallel Architecture

The serial port *J35µP - RS232* is enabled on all the units of the *RPA Parallel System*.

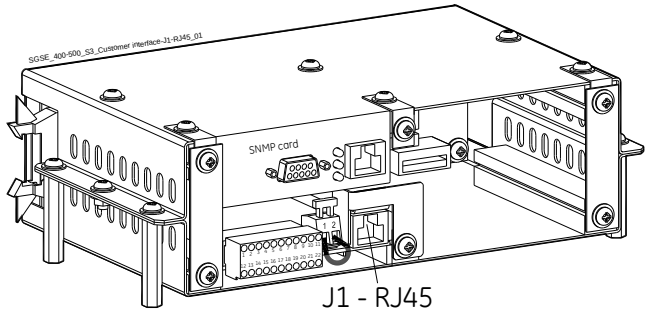


Fig. 9.1-3 Connector J1 – RJ45 8P8C

NOTE !

The serial port *J35µP - RS232* is enabled also in case the *J1-RJ45* connector of the *"P4 - Customer Interface" (see Section 9.2.1)* is already connected.

9.2 CUSTOMER INTERFACE BOARD

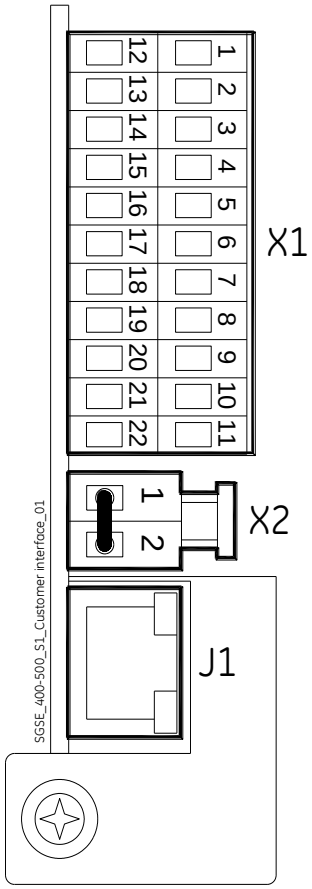


Fig. 9.2-1 Customer Interface Board

J1 connector– RJ45 8P8C (see Section 9.2.1)		
Pin 5: TX (out)	**Pin 6**: RX (in)	**Pin 4**: GND

X1 terminal block – Output signals on voltage free contacts (see Section 9.2.2)			
X1 / 1, 2, 3	NO, C, NC	MAINS FAILURE	(def. Parameter RL=1)
X1 / 4, 5, 6	NO, C, NC	LOAD ON INVERTER	(def. Parameter RL=3)
X1 / 7, 8, 9	NO, C, NC	STOP OPERATION	(def. Parameter RL=5)
X1 / 12, 13, 14	NO, C, NC	LOAD ON MAINS	(def. Parameter RL=2)
X1 / 15, 16, 17	NO, C, NC	GENERAL ALARM	(def. Parameter RL=4)
X1 / 18, 19, 20	NO, C, NC	BUZZER (acoustic alarm)	(def. Parameter RL=6)

The programmable signals on *X1* will be disabled with *Q1* open, with the exception of the signals for *"16 - MANUAL BYPASS ON"* and *"26 – EMERGENCY OFF (EPO)"*.

X1 terminal block – Input contacts (see Section 9.2.3)		
X1 / 10, 21	NO	Programmable
X1 / 11, 22	NO	Programmable / GENERATOR ON

X2 terminal block –EPO -Emergency Power Off connection (see Section 9.2.4)		
X2 / 1, 2	NC	EPO (Emergency Power Off)

Note: to enable this function, remove the *Jumper JP2* on *"P4 – Customer Interface" board* (see *Section 9.2.4*).

NO = Normally Open **C** = Common **NC** = Normally Closed

Output signals on voltage-free contacts	
On terminals *X1*, **6** of the following ***27 signals*** can be selected from the display, entering with the appropriate password.	
0- NO SIGNAL	*14- RECTIFIER MAINS FAILURE*
1- BUZZER	*15- BATTERY DISCHARGE*
2- GENERAL ALARM	*16- MANUAL BYPASS ON*
3- LOAD ON MAINS	*17- RECTIFIER ON*
4- STOP OPERATION	*18- INVERTER ON*
5- LOAD ON INVERTER	*19- BOOST CHARGE*
6- MAINS FAILURE	*20- BATTERY EARTH FAULT*
7- DC OVERVOLTAGE	*21- BATTERY FAULT*
8- LOW BATTERY	*22- RELAY INPUT 1*
9- OVERLOAD	*23- RELAY INPUT 2*
10- OVERTEMPERATURE	*24- RELAY OUTPUT ON*
11- INVERTER-BYPASS NOT SYNCHR.	*25- RELAY OUTPUT OFF*
12- BYPASS LOCKED	*26- EMERGENCY OFF (EPO)*
13- BYPASS MAINS FAILURE	*27- eBoost/IEMi MODE*

Programmable functions on input contacts
Some UPS functions can be activated with parameters when an external Normally Open (NO) contact is closed on: **X1/10, 21** or **X1/11, 22** Selectable functions by changing parameters (password required) are: *0 - NO FUNCTION* *1 - INVERTER ON* *2 - INVERTER OFF* *3 – PRINT ALL* *4 - STATUS RELAY* *5 - GENERATOR ON* *6 - EXTERNAL BYPASS* *7 - BATTERY FUSES OR EXTERNAL K3 (See Alarm 4104 - Battery Fuses)* *8 - eBoost/IEMi CONTROL* **Voltage free contacts:** Max. DC / AC: 24V / 1.25A IEC 60950 (SELV circuit) Min. Signal Level: 5Vdc / 5mA

9.2.1 Connector J1 – RJ45 8P8C

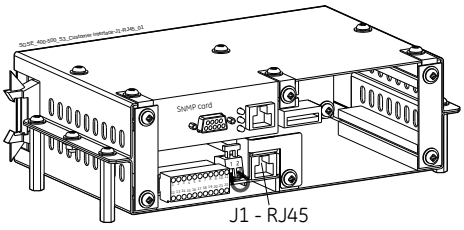


Fig. 9.2.1-1 Connector J1 – RJ45 8P8C

Total remote management of the system using software *GE iUPSGuard, GE Data Protection* or *GE Service Software* for system protection and management of the UPS systems.

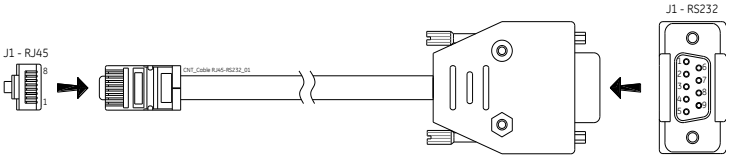


Fig. 9.2.1-2 RJ45 –RS232 adaptation cable

TLE Series 160 & 200 is supplied with an adaptation cable for a serial port *RS232 / sub DB9* connection.

RPA
Redundant Parallel Architecture

The connector *J1 – RJ45* is enabled on all the units of the *Parallel System*.

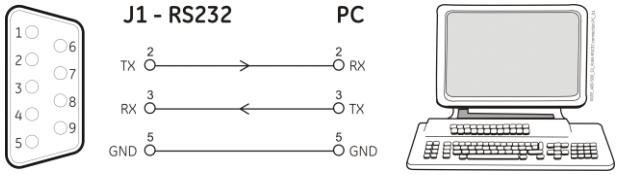


Fig. 9.2.1-3 Connector J1 to PC with RJ45 –RS232 adaptation cable

9.2.2 X1 terminal block - Output signals on voltage-free contacts

The *Customer Interface board* provides ***6 voltage free relay contacts*** giving some UPS critical alarms and operation mode.
These signals are available on terminal blocks ***X1***. Max. rating terminals: **1mm²**.

The meaning of the alarms on the free contacts in standard configuration (default) is the following:

X1 / 1, 2, 3	(NO, C, NC)	MAINS FAILURE	(def. Parameter RL=1)
X1 / 4, 5, 6	(NO, C, NC)	LOAD ON INVERTER	(def. Parameter RL=3)
X1 / 7, 8, 9	(NO, C, NC)	STOP OPERATION	(def. Parameter RL=5)
X1 / 12, 13, 14	(NO, C, NC)	LOAD ON MAINS	(def. Parameter RL=2)
X1 / 15, 16, 17	(NO, C, NC)	GENERAL ALARM	(def. Parameter RL=4)
X1 / 18, 19, 20	(NO, C, NC)	BUZZER (ACOUSTIC ALARM)	(def. Parameter RL=6)

In case different alarms or operating status are required, they can be configured on the same terminals via software from the *control panel*.
The configuration can be changed in ***parameters mode*** by a trained operator using the appropriate password.

NOTE !
The programmable signals on *X1* will be disabled with *Q1* open, with the exception of the signals for *"16 - MANUAL BYPASS ON"* and *"26 – EMERGENCY ON (EPO)"*.

9.2.3 X1 terminal block - Programmable input free contacts

Some programmable UPS functions (indicated in *Section 9.2)*, can be activated by closing an external contact, if connected, on:

X1 / 10, 21	User Input 1 (default = Not used)
X1 / 11, 22	User Input 2 (default = GENERATOR ON)

9.2.4 X2 terminal block - EPO (Emergency Power Off)

NOTE !

If an emergency button EPO (Emergency Power Off) is installed, the use of the XA terminals is recommended (see *Section 5.10).*

WARNING !

The connection of an emergency button EPO (Emergency Power Off) must be performed by QUALIFIED SERVICE PERSONNEL only when the UPS is COMPLETELY POWERED DOWN.

ATTENTION !

The reliability of the system depends on this contact NC (Normally Closed)!

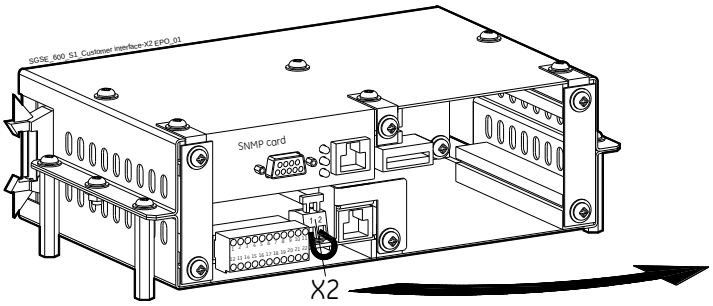


Fig. 9.2.4-1 X2 terminals for connection EPO

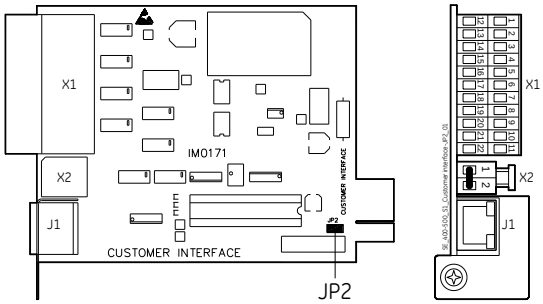


Fig. 9.2.4-2 Jumper JP2 on the P4 – Customer Interface

An Emergency button (Normally Closed voltage-free contact) can be connected on terminals ***X2 / 1, 2*** of the ***P4 - Interface Customer***.

Remove the cable short-circuiting terminals ***X2 / 1, 2*** when using this external switch.

When opened, this contact causes the immediate opening of the *Contactors K6* and *K7* as well as the shut-down of *Rectifier*, *Inverter* and *Static-Switch*.

NOTE !

This procedure could imply a *Load* shut-down.

NOTE !

To enable this function, remove *Jumper JP2* on the *"P4 - Customer Interface"*, when the cables have already been connected on *X2* (see *Fig. 9.2.4-2).*

In case of parallel *Customer Interface* (up to 3) the *EPO* contact must be connected to one *Customer Interface* only, but the bridge on *X2 / 1, 2* and *Jumper JP2* on the *P4 – Customer Interface* must be removed on all other boards (see *Fig. 9.2.4-1/2).*

RPA Redundant Parallel Architecture

In a Parallel System a separate NC (Normally Closed) contact must be connected individually to each unit.

When the *EPO* has been activated, the system must be restored as follows:

- Realise the push-button ***EPO*** (contact on *X2 / 1, 2* is closed again).
- Press the key *"**O**" (Inverter OFF* – see *Section 6.2*) on the control panel.

RPA Redundant Parallel Architecture

In case of a Parallel System press the key "O" (Inverter OFF) on the Control Panel of each unit connected on the parallel bus and having its output switch Q1 closed.

9.2.5 X1 terminal block - Gen Set Signalling (GEN ON)

If an emergency generator set supplies the UPS in case of *Mains Failure* and the generator is considerably unstable in frequency, it should be suitable to install the signal *"**GENERATOR ON**"* on ***X1 / 11, 22***. See *Fig. 9.2-1 / X1*.

Since the Parameter for of the reading of the Generator function is password protected, call the nearest *Service Centre* for it's activation.

When this contact closes, it changes certain (programmable) functions such as:

- Enabling or disabling of synchronization and consequently the *Load* transfer to generator.
- Reduction or elimination or delay of *Battery* recharging during the generator operation.

Additionally, when the *"**GENERATOR ON**"* input contact is closed, the UPS will inhibit *eBoost™ Operation Mode* and revert to double-conversion operation.

It is advised to contact your *Service Centre* for further details.

RPA Redundant Parallel Architecture

In a Parallel System a separate NO (Normally Open) contact must be connected to each individual unit.

9.2.6 X1 terminal block - AUX external Maintenance Bypass

If the UPS system is equipped with an external *Maintenance Bypass Switch*, it is possible to connect a *NO* (Normally Open) voltage-free aux. contact from the *External Bypass Switch* to the programmable input ***X1 / 10, 21***, making the UPS operate as if the internal switch ***Q2*** has closed.

This function can be activated by changing a dedicated parameter (password required).

When this *NO* (Normally Open) contact closes, the output *Inverter Contactor* ***K7*** it is automatically opened and the *Load* transfer back to *Inverter* will be inhibited.

RPA Redundant Parallel Architecture

In a Parallel System, the input on the Customer Interface of each unit must be connected to a separate AUX contact of the External Maintenance Bypass Switch.

9.2.7 X1 terminal block - eBoost/IEMi control signal

The UPS operation in either *eBoost* or *IEMi* operating modes can be controlled via an *NO (Normally Open)* contact by installing the "***eBoost/IEMi CONTROL***" signal, routed to the programmable function contacts (see *Section 9.2.3)*.

When this contact closes, *eBoost* or *IEMi* operation mode is inhibited.
The Parameter for the activation of such function is password protected.
Call the nearest *Service Centre* for its activation.

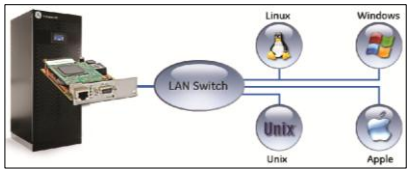
This function is particularly useful for controlling *eBoost* or *IEMi* operation following critical conditions on either the load side or the input utility, including generator operation when the "*GENERATOR ON*" signal has not been installed.

RPA Redundant Parallel Architecture

When using the "eBoost/IEMi control" function on the programmable user relays of the Customer Interface X1 terminals in a Parallel System, a separate NO (Normally Open) contact must be connected to each individual unit.

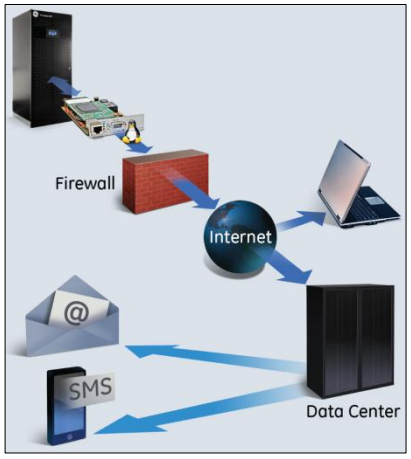
10 OPTIONS

10.1 CONNECTIVITY OPTIONS



3-ph SNMP/WEB plug-in adapter
SNMP - Simple Network Management Protocol

The *3-ph SNMP/WEB plug-in adapter* is an interface to the *Ethernet Network*, and provides UPS information via the standard *SNMP Protocol* (UPS-MIB (RFC-1628); GE Single MIB; GE Parallel MIB).
The UPS can therefore be managed by a *Network Management System (NMS)* or by our applications (for instance *GE iUPSGuard or GE Data Protection)*, which uses this information to determine the state of the UPS in order to guarantee safe and orderly shut-down of the server, when needed.



GE iUPSGuard

GE's *iUPSGuard* is a remote monitoring solution for UPS, providing status monitoring and alarm notification that supports all GE UPS product lines, anytime, anywhere.
iUPSGuard provides current and detailed information about UPS operation, including its configuration, internal alarms and operating conditions over web.
iUPSGuard notifies personnel of critical alarms and events via email or SMS, allowing a user or GE technician to make timely decisions on critical conditions.
In addition, comprehensive data collection and analysis improves diagnostics capability and enhances response time.
Continuous monitoring and ongoing maintenance help ensure maximum performance of your UPS equipment as it protects business critical applications.

GE Data Protection

GE Data Protection

GE Data Protection software can communicate with the UPS over *RS-232*, *USB* or *SNMP* to receive status information and measurement values of the UPS. In case of a critical condition (time on battery, remaining battery autonomy time or low battery) for the Load, the software starts a controlled shut-down.
An enhanced alarm management system provides the possibility to start applications, send messages, and send e-mails for every upcoming or disappearing alarm.

10.2 OPTIONS IN UPS CABINET

eBoost™ Operation Mode

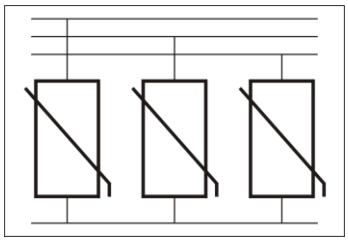
High efficiency operating mode, where the *load* is supplied directly by *mains* and automatically transferred to *inverter* if the voltage is out of prescribed tolerances.

RPA Kit
Redundant Parallel Architecture

Up to 6 units parallel possible for redundancy or capacity in RPA configuration.

Auxiliary Power Supply (APS) 24Vdc

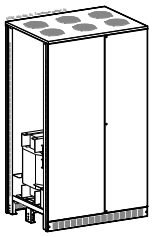
For assembling and connection please refer to *Section 10.4.1*.



Surge suppressors

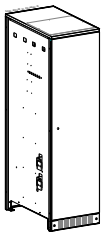
To assure the protection of the UPS in case of high peak voltages from utility power.

10.3 OPTIONS IN ADDITIONAL CABINETS



Rectifier or bypass or UPS input transformer

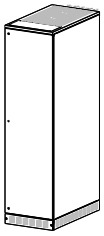
Located in additional cabinet (W x D x H):
TLE Series 160 & 200: 850 x 865 x 1905 mm (33.47 x 34.06 x 75.00 inches)



Top entry cables cabinet

Allows the connection of input and output cables from the top of the UPS.

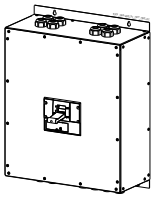
Located in additional cabinet (W x D x H):
250 x 865 x 1905 mm (9.85 x 34.06 x 75.00 inches)



EMC Filter

EMC Filter is used to reduce conducted electromagnetic interference to the limits specified in the *EMC (Electromagnetic Compatibility) standards IEC 62040-2 / Category C2 (formerly Class A)*

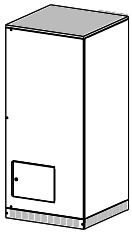
Located in additional cabinet (W x D x H):
600 x 865 x 1905 mm (23.63 x 34.06 x 75.00 inches)



CB3 battery disconnect box

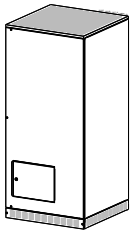
Permits the operator to connect and disconnect the external battery to the UPS.

Located in additional cabinet (W x D x H):
685 x 415 x 870 mm (26.97 x 16.34 x 34.26870 inches)



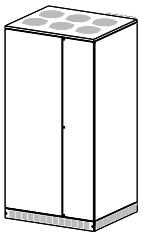
Empty battery cabinets

Dimensions (W x D x H):
1120 x 865 x 1905 mm (44.10 x 34.06 x 75.00 inches)



Battery cabinet 2 x 50Ah and 1 x 75Ah

Dimensions (W x D x H):
1120 x 865 x 1905 mm (44.10 x 34.06 x 75.00 inches)



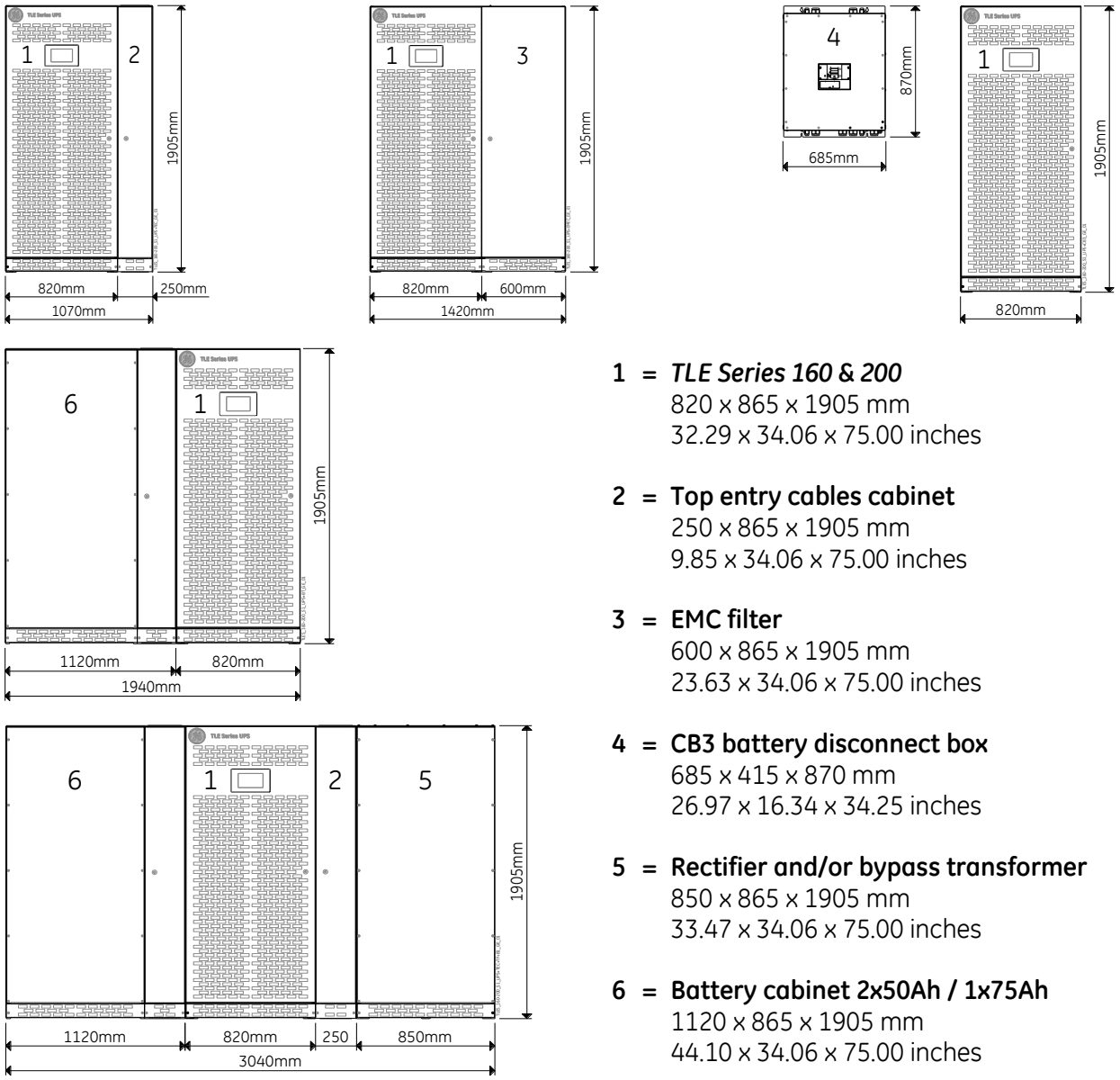
Parallel output cabinet with centralized maintenance bypass

Located in additional cabinet (dimension according to RPA Parallel System units).

NOTE !

Connections for the options, supplied in separated additional cabinets, are described in the *"INSTALLATION GUIDE"* found inside the optional cabinet.

10.4 DISPOSITION OPTIONS TLE SERIES 160 & 200



1 = *TLE Series 160 & 200*
820 x 865 x 1905 mm
32.29 x 34.06 x 75.00 inches

2 = Top entry cables cabinet
250 x 865 x 1905 mm
9.85 x 34.06 x 75.00 inches

3 = EMC filter
600 x 865 x 1905 mm
23.63 x 34.06 x 75.00 inches

4 = CB3 battery disconnect box
685 x 415 x 870 mm
26.97 x 16.34 x 34.25 inches

5 = Rectifier and/or bypass transformer
850 x 865 x 1905 mm
33.47 x 34.06 x 75.00 inches

6 = Battery cabinet 2x50Ah / 1x75Ah
1120 x 865 x 1905 mm
44.10 x 34.06 x 75.00 inches

Weights *TLE Series 160* & *200* and options

	UPS		Option in additional cabinet							
UPS model	UPS standard (820 x 865 x 1905mm)	Floor loading UPS standard	Top entry cables cabinet (250 x 865 x 1905mm) (2)	EMC filter for common mains input (600 x 865 x 1905mm) (3)	EMC filter for separate mains input (600 x 865 x 1905mm) (3)	CB3 battery disconnect box (685 x 415 x 870m) (4)	Rectifier / bypass transforme (850 x 865 x 1905m) (5)	Battery cabinet empty (1120 x 865 x 1905m) (6)	Battery cabinet 2 x 50Ah (1120 x 865 x 1905m) (6)	Battery cabinet 1 x 75Ah (1120 x 865 x 1905m) (6)
TLE Series 160	230 kg 507 lbs	705 kg/m² 145 lbs/sq.ft	80 kg 177 lbs	250 kg 552 lbs	280 kg 618 lbs	80 kg 177 lbs	700 kg 1544 lbs	450 kg 993 lbs	1500 kg 3308 lbs	1700 kg 3749 lbs
TLE Series 200							800 kg 1764 lbs			

Note: Single weights have to be added up for system configuration to get the total weight!!

11 MAINTENANCE

WARNING !

All maintenance and service works must be performed by QUALIFIED SERVICE PERSONNEL.

11.1 MAINTENANCE

A UPS system, like other electrical equipment, needs periodic preventive maintenance.
A regular maintenance check of your installation guarantees higher reliability of your safe power supply.

GE's Critical Power recommends to perform the first service within **12 months** from the commissioning date or within **18 months** from delivery date.
Subsequent services to perform every **12 months**.

Preventive maintenance work on the UPS can be done only by trained *SERVICE TECHNICIANS*.

We therefore recommend you sign a Maintenance and Service contract with the local ***Service Centre*** organisation.

11.1.1 Service check

If this lamp lights up during normal operation, the unit has not been serviced for the last 20,000 hours by a *GE TRAINED TECHNICIAN*.

Some components of the UPS which need periodic maintenance, if not replaced, could cause a reliability reduction of the supply system

We highly recommend that you contact your *Service Centre* for preventive maintenance work.

11.1.2 Fans and ventilation

We recommend a periodic cleaning of the ventilation channels and grids on the UPS system, in order to guarantee proper air circulation in the unit and in the *Battery*.

The fans eventually wear out and must be substituted when a UPS alarm is triggered, in order to ensure the reliability of the UPS.

11.1.3 Other components with limited lifetime

Various components, such as the DC and AC filter capacitors and the lithium battery on the "*P3 -Control Panel*" (memory saving), must be systematically substituted in order to maintain the UPS'S reliability.
The substitution of these components is signalled by a UPS alarm going off.

11.1.4 Battery

We recommend a periodic *Manual Battery Test*, especially if the *Automatic Battery Test* is disabled, in order to verify if the *Battery* can provide the expected backup time in case of *Mains Failure*.

We recommend that this test is performed at least every **3 months**, especially if the *Battery* is not sufficiently discharged during normal operation.
The discharge time you use should be at least half of the *Battery* runtime.

For *Automatic Battery Test* setting, a special code is required to enter user set-up parameters.
The start-up technician has access to this code and can program this feature during start-up.

Please consider that, if you did a full *Battery Test* to verify the full runtime of the *Battery*, the charger needs at least **8 hours** to recharge the *Battery* up to 90% of its capacity.

Long shut-down periods of the UPS system

To guarantee that the *Battery* is fully charged, the UPS system should be in operation for at least **12 hours every 3 months**.
If not the *Battery* may be permanently damaged.

11.1.5 UPS room conditions and temperature

The UPS room and the *Battery Room* have to be maintained clean and free from dust.

A high temperature of the UPS room and of the *Battery Room* affect the lifetime of several components inside the equipment.

The *Battery* is very sensitive to room temperatures above **77°F** (25°C).

11.1.6 Preventive maintenance program

a) Cleaning, a visual inspection and a mechanical inspection of the UPS modules.

b) Replacement of defective parts or the preventive replacement of parts with a defined lifetime.

c) "Updating" of the equipment (technical improvements subsequent to the delivery).

d) Check the calibration of *DC voltage* and *Inverter Output Voltage* and *Frequency*.

e) Check of the settings of the electronic regulation, the control and the alarm circuits of the *Rectifier(s)* and *Inverter(s)*.

f) Functional checks on *Thyristors*, *Diodes*, *Transformers*, *Filter Components*, e.g. to ensure that they are operating within the specified design parameters.

g) Overall performance test including a *Mains Failure* simulation with and without the *Load*.

h) Monitoring *Battery* operation in discharge and recharge mode including any boost charge duties.

NOTE !

Ask to your local *Service Centre* to submit the form of *Preventive Maintenance Contract* suitable for your specific needs.

12 NOTES

12.1 NOTES FORM

It is recommended to note in this section ***Notes***, with date and short description all the operations performed on the UPS, as: maintenance, components replacement, abnormal situations, etc.

Date	*Description*	*Done by*

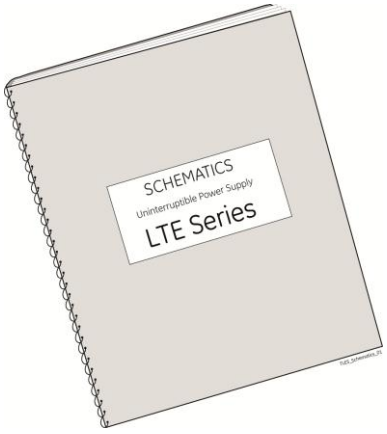
13 ANNEX

13.1 TECHNICAL DATA SHEET

Technical Data Sheet

These are included in the last section and are listings of the technical data of the UPS.

13.2 UPS SCHEMATIC DIAGRAMS



UPS Schematic Diagrams

These are included in the last sections and include assembly layouts and functional drawings.